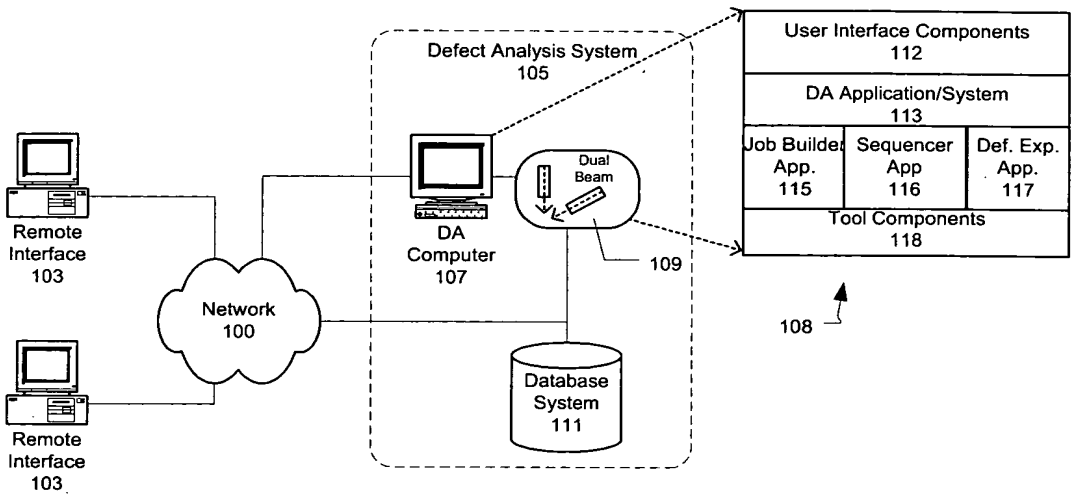


Figure 1A

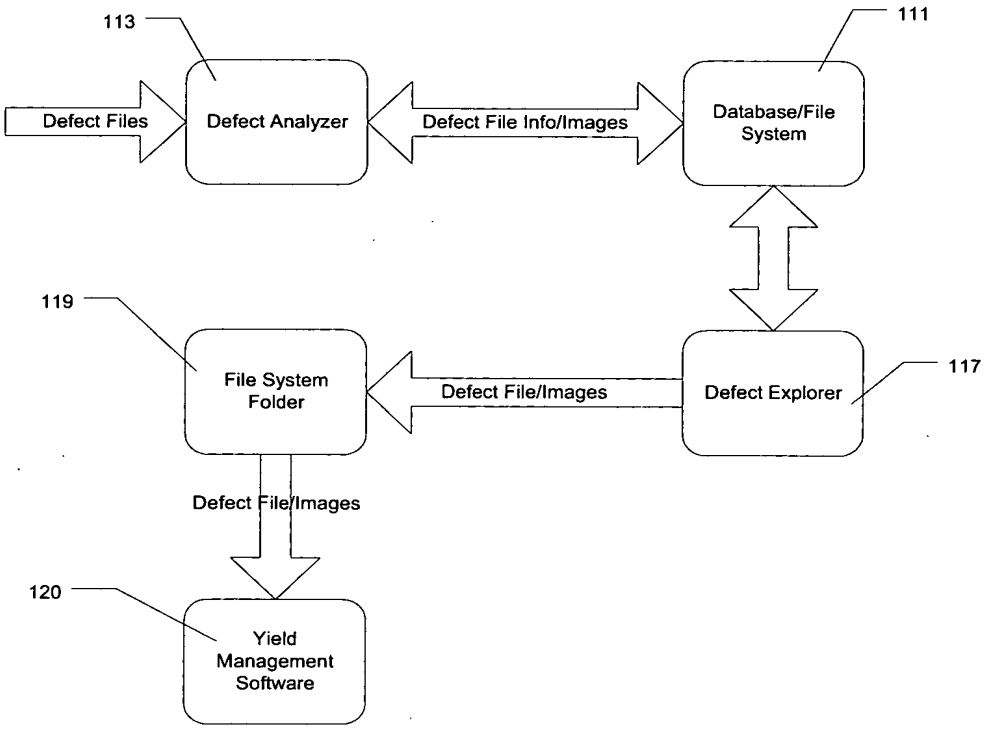


Figure 1B

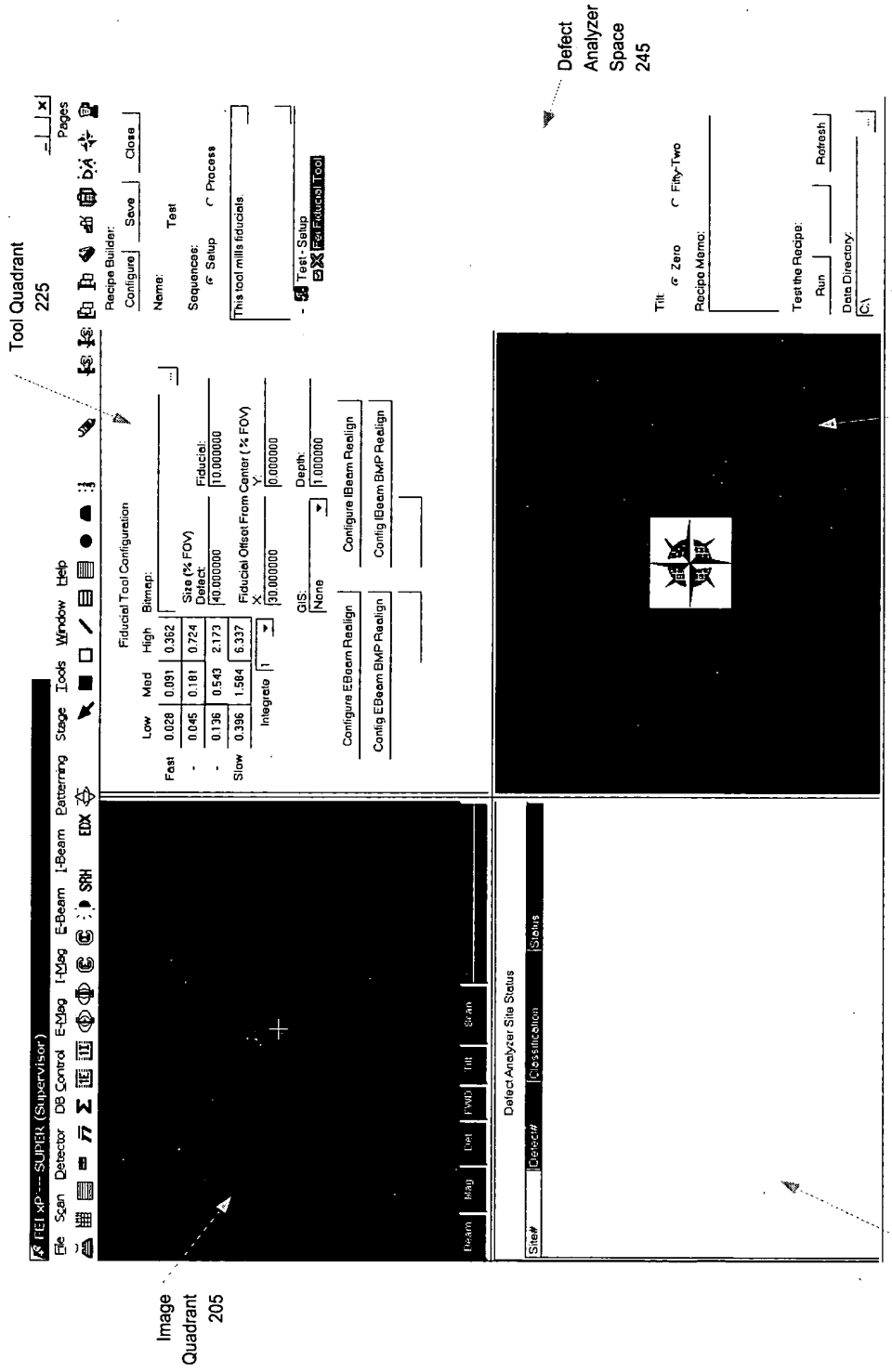

Tool Quadrant
225
Defect
Analyzer
Space
245
Image
Quadrant
205
Navigation
Quadrant
235
Site Status
Quadrant
215
FEI xP---- SUPER (Supervisor)
File Scan Detector DB Control E-Mag I-Mag E-Beam I-Beam Patterning Stage Tools Window Help
Pages
Fiducial Tool Configuration
Recipe Builder:
Configure
Save
Close
Name:
Test
Sequences:
Setup
Process
Low Med High
Fast 0.028 0.091 0.362
0.045 0.181 0.724
Slow 0.136 0.543 2.173
0.396 1.584 6.337
Integrate 1
Bitmap:
Size (% FOV)
Defect: 40.000000
Fiducial: 10.000000
Fiducial Offset From Center (% FOV)
X: 30.000000
Y: 0.000000
GIS:
None
Depth: 1.000000
Configure EBeam Realign
Config EBeam BMP Realign
Configure IBeam Realign
Config IBeam BMP Realign
This tool mills fiducials.
Test - Setup
Test Fiducial Tool
Tilt:
Zero
Fifty-Two
Recipe Memo:
Test the Recipe:
Run
Refresh
Data Directory:
C:\
IBeam
Mag
Diet
FWD
Tilt
Scan
Defect Analyzer Site Status
Site#
Defect#
Classification
Status

Figure 2

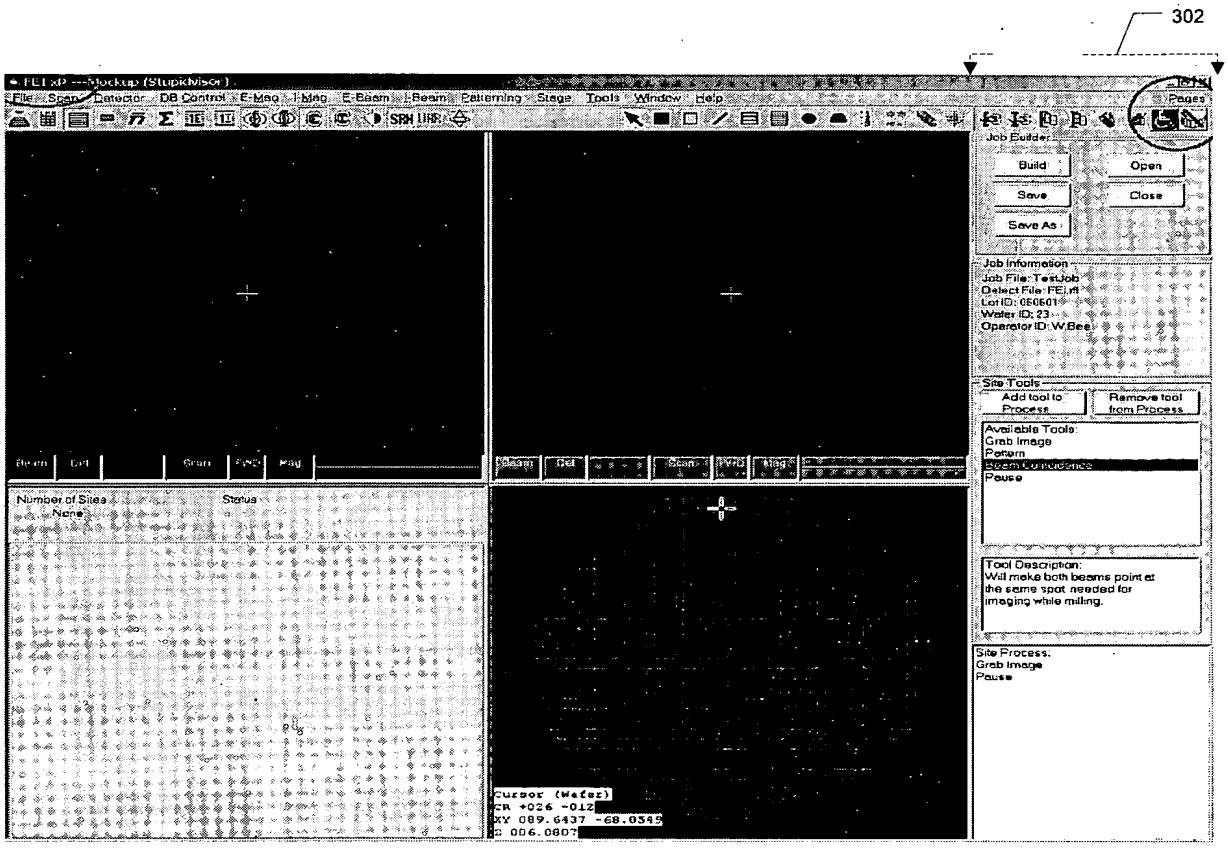


Figure 3A

Item	Description
Job Builder:	
Build	Initiates building of new job
Save	Save the job information.
Save As	Functions conventionally
Open	Functions conventionally
Close	Functions conventionally
Job Information	Functions conventionally
Site Tools:	
Add Tool to Process	Inserts selected tool into process
Remove Tool from Process	removes selected tool from process
Available Tools	Displays tools available for processes
Tool Description	Brief description of tool
Site Process	Displays process (recipe) as it is being constructed by user

Figure 3B

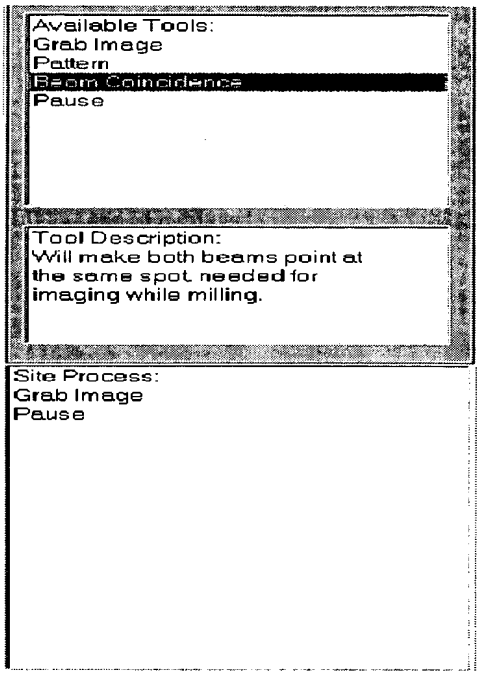


Figure 3C

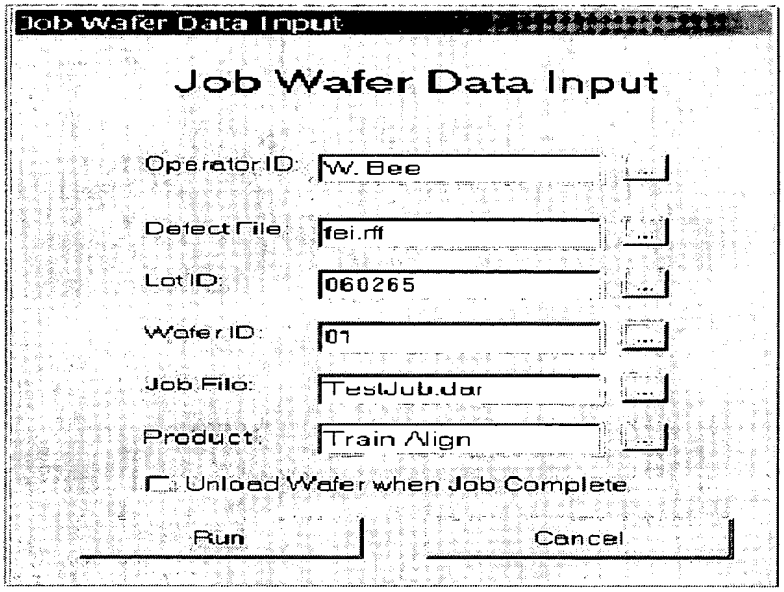


Figure 3D

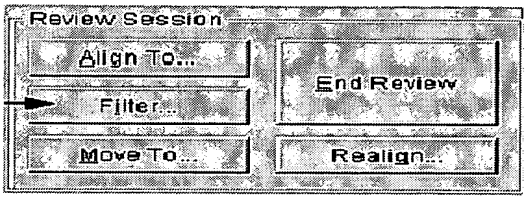


Figure 3E

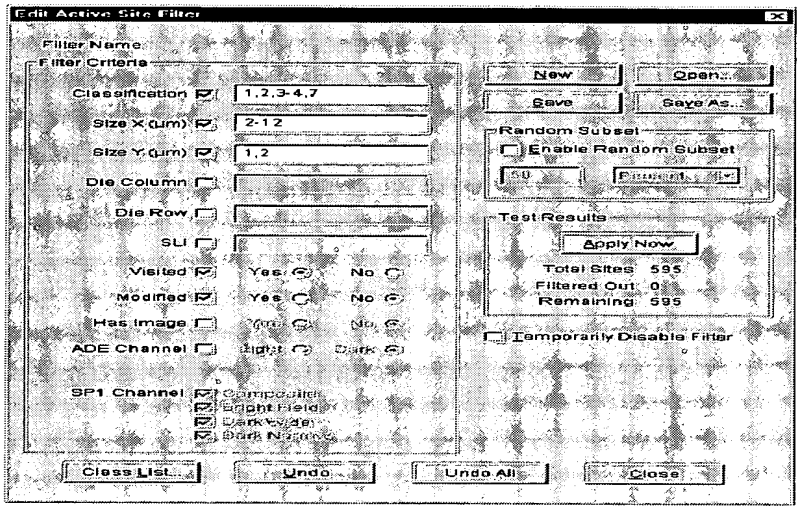


Figure 3F

Interface Items	Description
Filter Name	Identifies the filter.
Filter Criteria	These check boxes and list boxes select the filter criteria.
New	Creates a new filter file.
Open	Opens an existing filter.
Save	Saves the edited filter definition. It is available only if allowed by configuration.
Save As	Saves the edited filter definition to a new file name. It is available only if allowed by configuration.
Random Subset	Specifies the maximum number of random sites passing the filter.
Test Results	Tests and reports the effect of site filter changes.
Temporarily Disable Filter	Temporarily disables the active site filter.
Graph	Displays a histogram of the defect sites.
Class List	Opens the Edit Class List dialog box.
Undo	Undoes the last change. You cannot undo changes already saved to file.
Undo All+	Undoes all changes made since dialog box opened. You cannot undo changes already saved to file.
Close	Closes the dialog box. Applies the defined filter to the current review session but does not save the filter to file.

Figure 3G

Criterion	Value Type	Description
Classification	Integer	Classification code assigned to the site
Size X (µm)	Real	X dimension of the site in microns
Size Y (µm)	Real	Y dimension of the site in microns
Die Colum+n	Integer	Die column of the die containing the site
Die Row	Integer	Die row of the die containing the site
SLI	Integer	Scattered light intensity reported for the site
Visited	Yes/No	Site has or has not been visited during the review session
Modified	Yes/No	Site has or has not been classified or relocated during the review session
ADE Channel	Light/Dark	Select sites from either the light or the dark channel.
SP1 Channel	n/a	Site has selected attributes. This filter is active if the defect format is T7x00 and the defect file has more than one channel.
Has Image	Yes/No	Site has or does not have image data associated with it

Figure 3H

Relational Operators	Meaning
=	Equal to
!=	Not equal to
<	Less than
<=	Less than or equal to
>	Greater than
>=	Greater than or equal to

Figure 3I

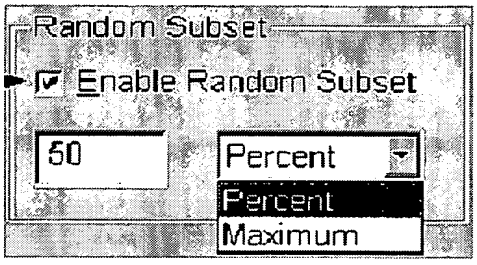


Figure 3J

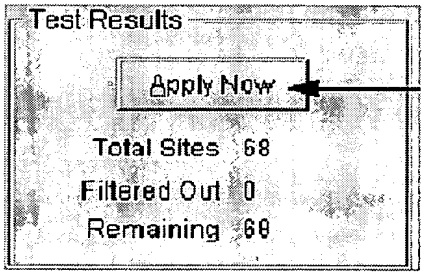


Figure 3K

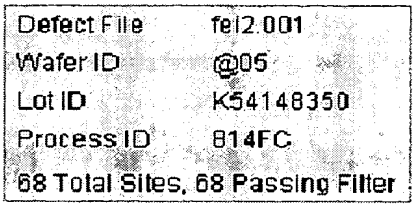


Figure 3L

Figure 3M

Defect #	Size X	Size Y	Classification Recipe Name	Die Row

Figure 3N

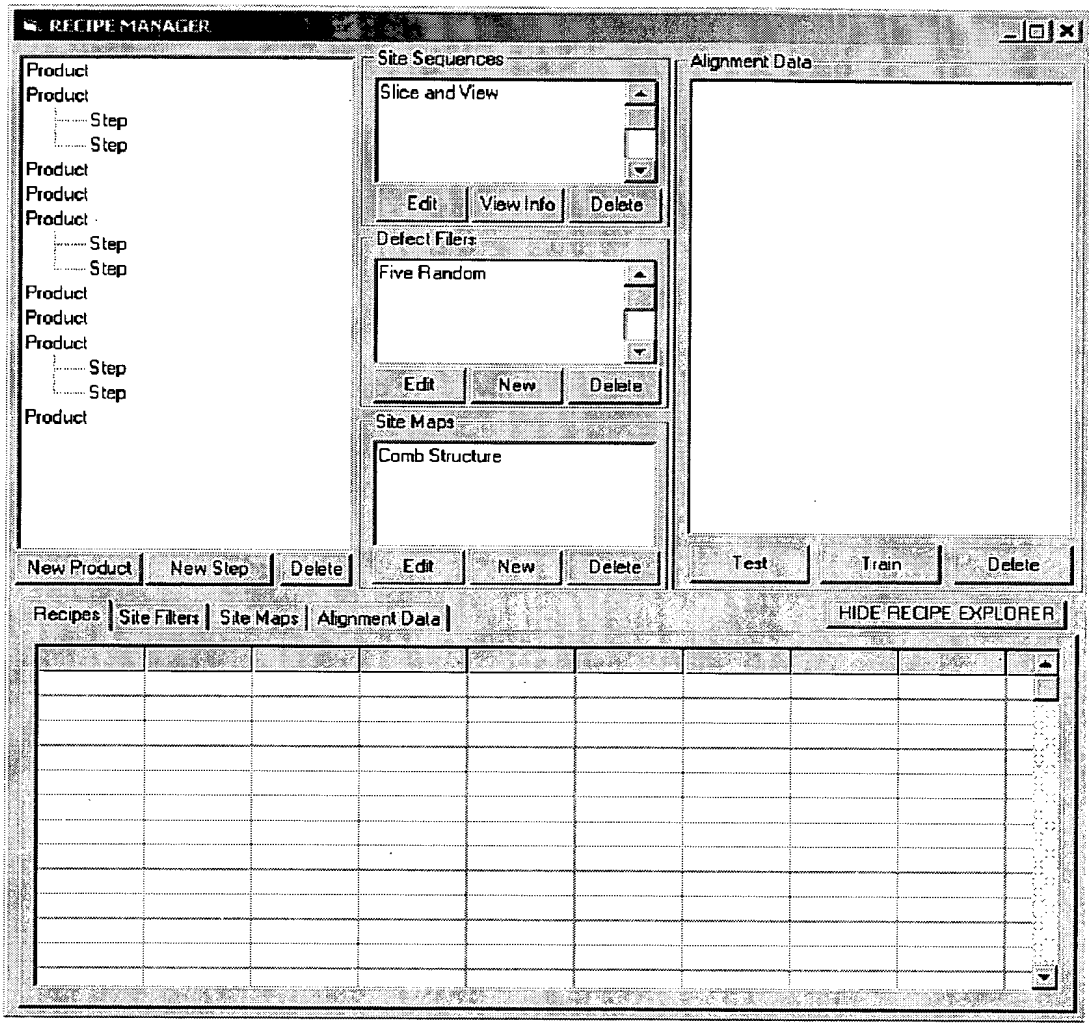


Figure 3O

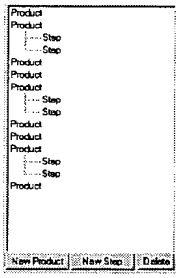


Figure 3P

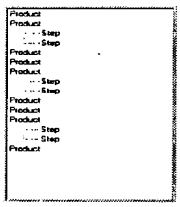
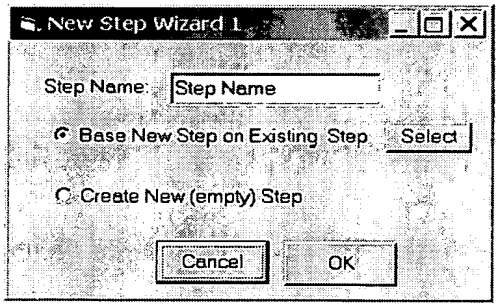
Control	Description	Behavior
	Product/Step Tree View: This is the interface through which specific Steps are created, edited, and deleted.	Sorting: Alphabetized by Product, then by Step. Node Behavior: Expandable and Collapsible through a standard interface. Persist Expansions for the life of the dialogue. Scroll Bars: Scrolling should be allowed.
	New Product Button: This is used to add a New Product to the Database.	Click: This should launch a "New Product Wizard" which is described below.
	New Step Button: This is used to add a New Step to whichever product is selected in the Product/Step Tree View (above).	Enable/Disable: Enable if a Product has been selected. Disabled otherwise. Click: This should launch the "New Step Wizard" which is described below.
	Delete Button: This is used to remove products or steps from the database.	Click: This should launch a standard two-button dialogue with the message "Permanently Delete [Product/Step] Information?". The buttons are "Cancel" and "OK".

Figure 3Q



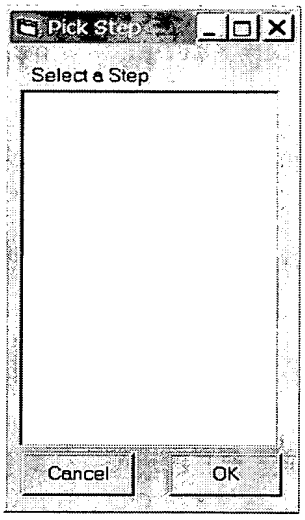


Figure 3R

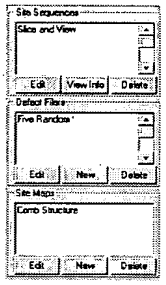


Figure 3S

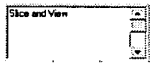
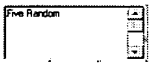
Control	Description	Behavior
	Site Sequence List Tree View: This displays a list of Site Sequences which can be expanded to show the names of the tools.	Scrolling: Should be scrollable. Node Behavior: Expanded nodes should stay expanded. Alphabetized. Click: This should highlight the site sequence. Default selection: The first site sequence in the list should be highlighted by default. Double-Click: This should expand the node to display the list of tools within the site sequence. Mouse Over: This should display the Site Sequence Name followed by the text description of the site sequence (if any).
	Edit Button: This loads the site sequence into the Recipe Builder page.	(Optionally) the page display should be switched to the Recipe Builder. Click: Load the selected site sequence into the recipe builder page
	View Info Button: THIS BUTTON HAS BEEN REMOVED.	NOT APPLICABLE. (The tree view functionality eliminates the previously envisioned function of this button).
	Delete Button: This button removes the site sequence from the database.	Click: This removes the site sequence from the database as far as the user is concerned. The actual implementation should include an "Is Deleted" flag to indicate that the site sequence should not be displayed. This will prevent previously configured processes from being invalidated.
	Site Filter Text Box: This shows a list of all Site Filters available for the selected Product/Step in the Product/Step Tree View control (above).	Alphabetize. Click: Highlight the site filter. Default Selection: The first of the list should be highlighted by default.
	Edit Button: This is used to edit the highlighted site filter.	Click: Launch the site filter dialog for the highlighted site filter.

Figure 3T

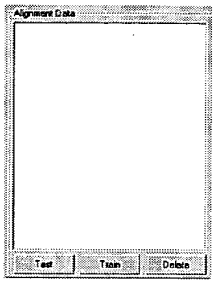


Figure 3U

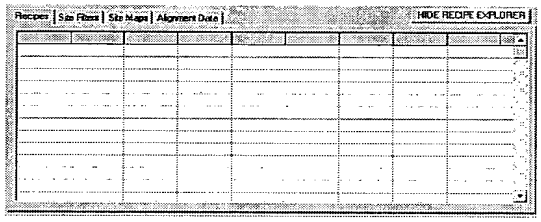


Figure 3X

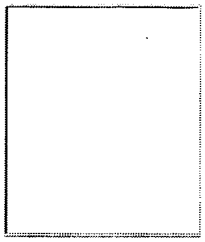
Control	Description	Behavior
	**Alignment Data Tree View.** This is a tree view showing the Alignment data in the following order.	Node coloring: The nodes should be colored red if they or a child is untrained. Data Structure: A preliminary data structure for this tree is shown and described in the following section.
	**Test Button.** If appropriate, this should test the selected alignment on the wafer loaded into the system.	Enable/Disable: This is dependant on the highlight node of the Alignment Data Tree View. For certain alignments test functionality will not be appropriate and should not, therefore, be applied. Click: Run the alignment for the highlighted node and all child nodes in the Alignment Data Tree View.
	Train Button. If appropriate, this should initiate the portion of the Alignment Training Wizard for the selected node.	Enable/Disable: For some nodes this control may not make sense or may require functionality not provided by the software. In these situations the control should be either disabled or handled through a clear, concise error message. For example, training the zero degree alignments for a wafer loaded at 52 degrees might prompt the user to tilt to zero degrees and try the alignment again. Click: Run the portion(s) of the alignment training wizard for the highlighted node and child nodes. Note that there may be unanticipated exceptions that need to be dealt with (such as no wafer is loaded) that will require increased robustness in the handling of errors and exceptions. These will be ferreted out at a later time.
	Delete Button: This *permanently* deletes alignment data from the database.	Click: This should launch a standard two button dialogue with the message "This will

Figure 3V

Control	Description	Behavior
HIDE RECIPE EXPLORER		
Recipe	**Recipe Tab.** This should have the following fields. o Product o Step o Recipe Name o Creation Date	
Site Filters	**Site Filter Tab.** This should have the fields listed below. As an added feature, there could be a "view filter button" to allow a quick look at the data through a new window. o Product o Step o Site Filter Name o Creation Date	
Site Maps	**Site Map Tab.** This should have the fields listed below. As an added feature, there could be a "view filter button" to allow a quick look at the data in a new window (similar to above). o Product o Step o Site Map Name o Creation Date	
Alignment Data	**Alignments Tab.** This is a complex control, but the should have the fields listed below. Alignment Node should be a path which indicates where the alignment data exists on a tree structure identical to that described above. o Product	

Figure 3Y

- Alignment Name #1
  - Wafer Alignment
    - Product Offset
    - Zero Degrees
      - Alignment Dies
      - Top-Down Electron Beam Image
      - Ion Beam Image
    - Fifty-Two Degrees
      - Alignment Dies
      - Ion Beam Image
      - Electron Beam Image
  - System Calibrations
    - Height Probe Offset
      - Zero Degrees
      - Fifty-Two Degrees
- Alignment Name #2

...

Figure 3Z

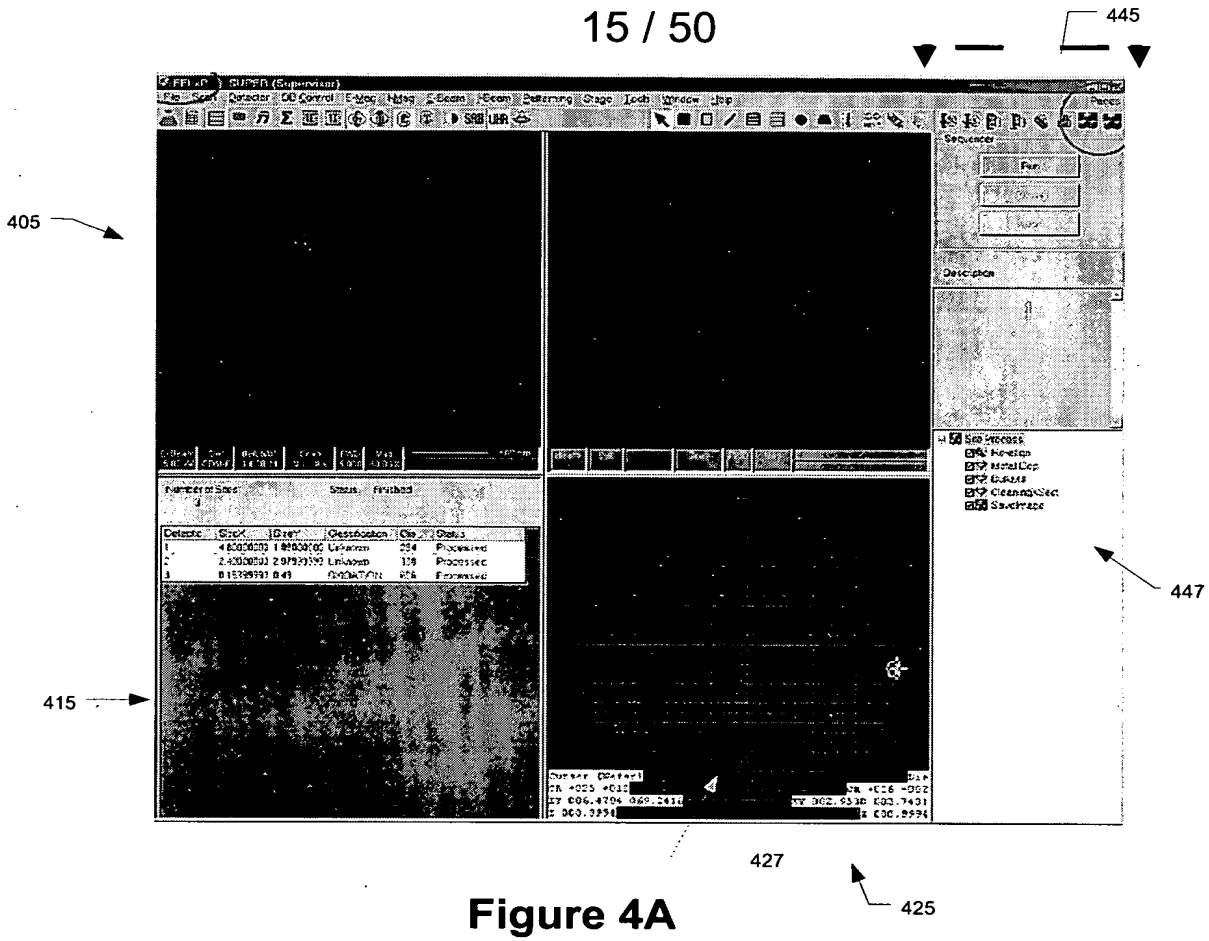
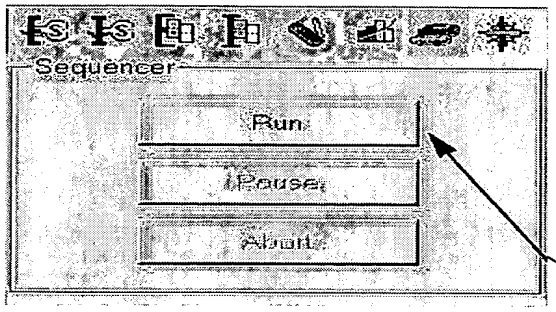
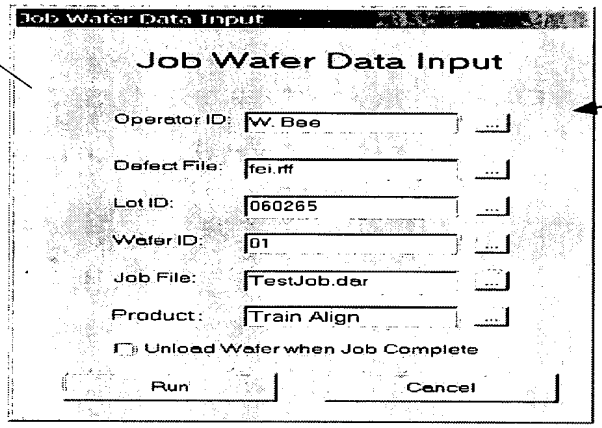


Figure 4A

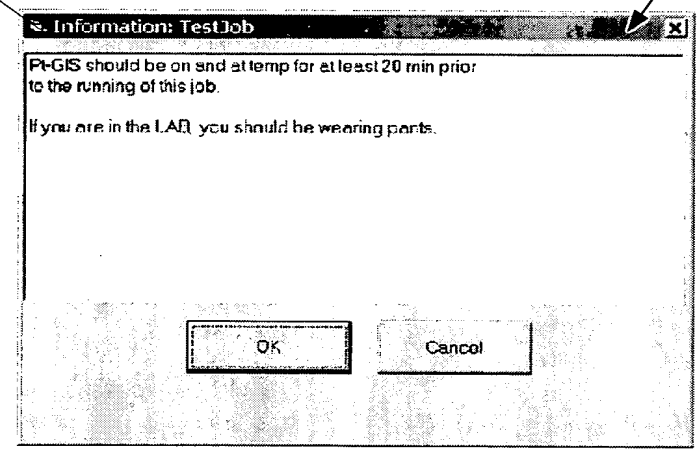
Item	Description
Run	Loads the wafer and runs the selected job.
Pause	Pause job execution
Abort	Terminate job execution
Description	Comment text describing job if included in job
Site Process	Displays job process tools

Figure 4B





462



464

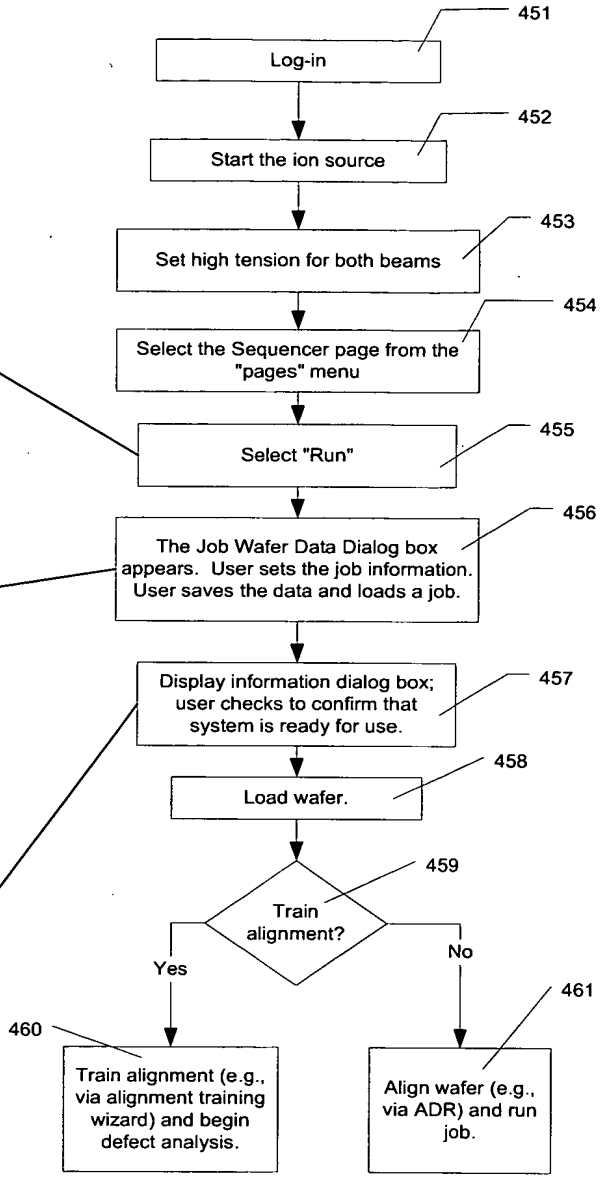


Figure 4C

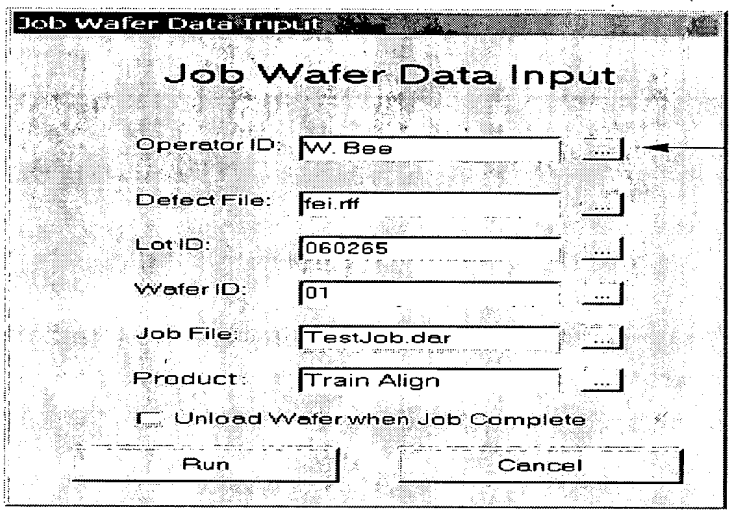


Figure 4D

Interface Item	Description
Operator ID	Required field where the user enters name.
Defect File	Defect file for the job. User opens an existing defect file. Clicking the select button opens the Select Defect File dialog box.
Lot ID	Maximum of 15 characters. Value is read in from defect file or job file, selected from dialog box, or entered by the operator.
Wafer ID	Maximum of 5 characters. Value is read in from defect file or job file, selected from dialog box, or entered by the operator.
Job File	Selects a recipe or job file. The recipe contains no wafer information. The job file contains wafer information. They have different extensions, .daj and .dar.
Product	Identifies the alignment wizard for the wafer. If TRAIN ALIGN is selected, when the user clicks RUN, the Alignment Training wizard starts.
Cass A/B	Shows the slots that are occupied.
Inventory	Inventories the cassettes.
FlexiLock	Shows if wafer is in the cassette.
Unload wafer when job complete	Provides automated wafer unloading when a job is complete.
RUN	Dialog box closes and the Information dialog box displays. When user clicks OK in Information dialog box the sequencer runs the job. This button is not active until information for at least one wafer is entered.
Cancel	Dialog box closes without saving the values. In job builder, the dialog box closes and the Add Tool interface displays. In sequencer, a warning box displays so that the user does not unintentional lose information. Then, the Sequencer page becomes active again.
Select button	Opens dialog where predefined files, wafers, etc., can be selected.

Figure 4E

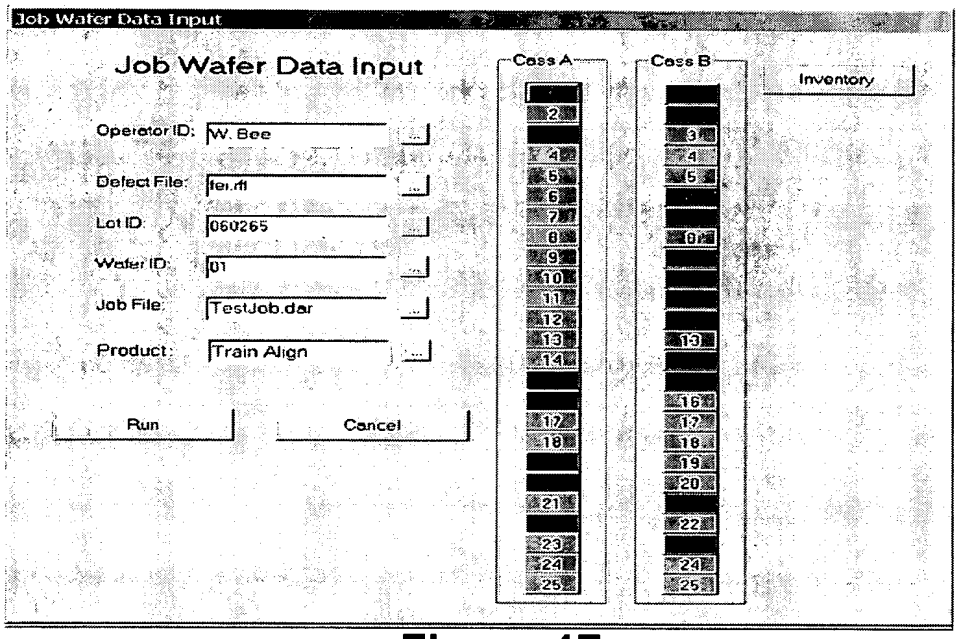


Figure 4F

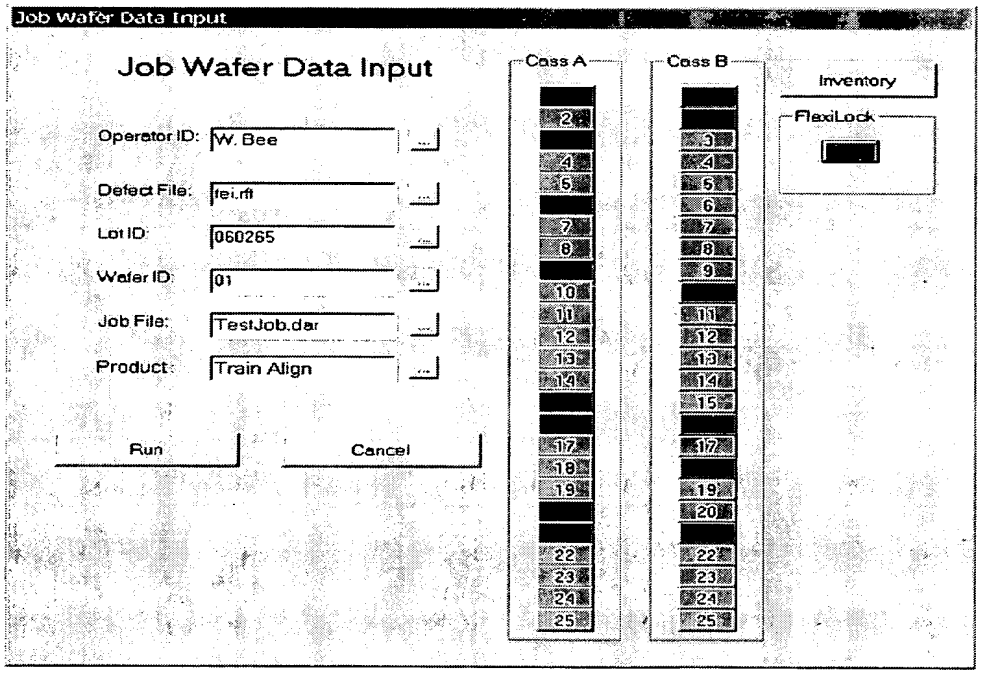


Figure 4G

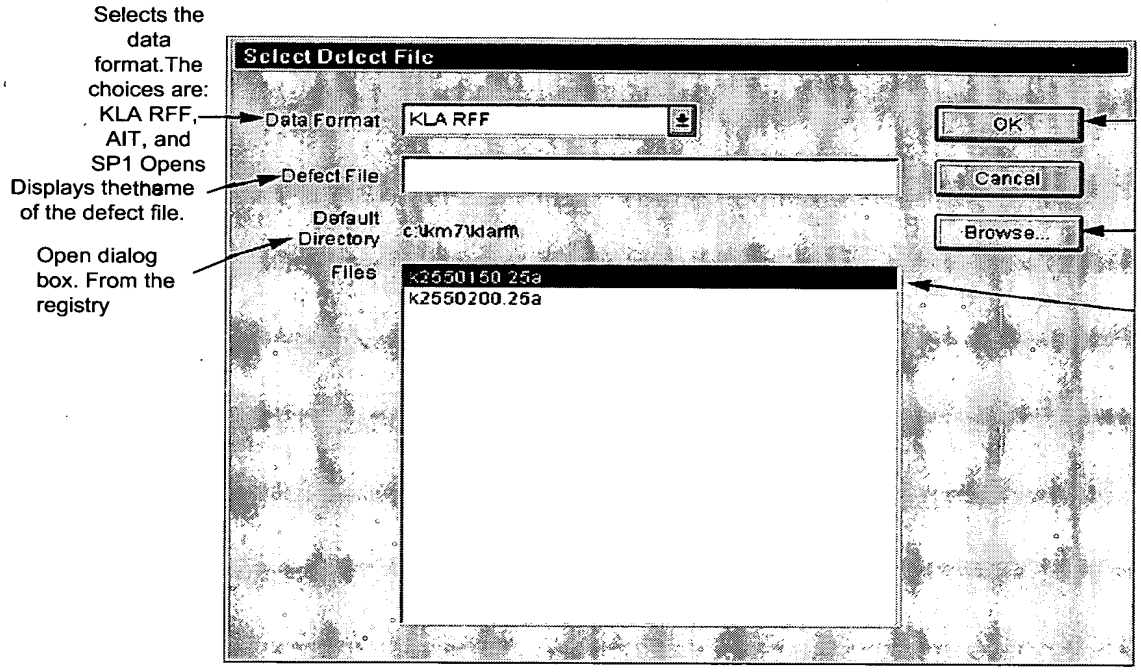


Figure 4H

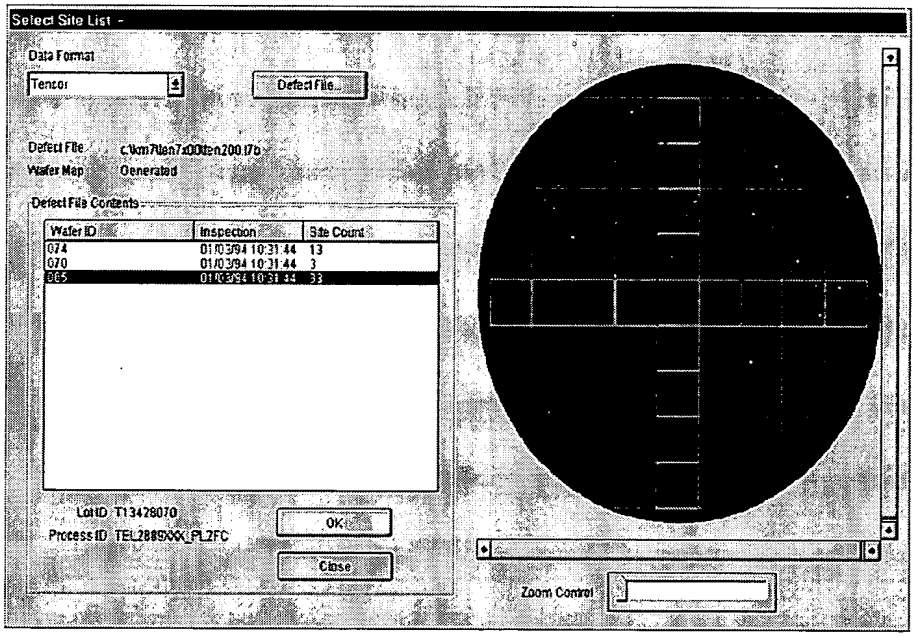


Figure 4I

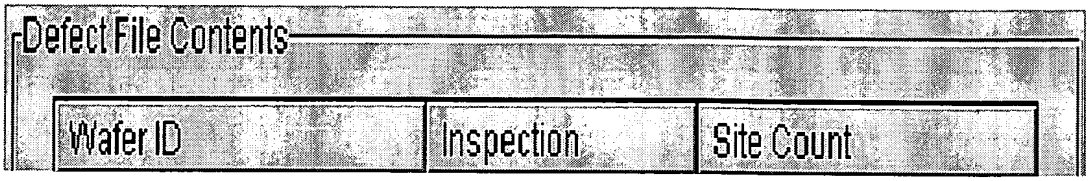


Figure 4J

Column Header	Description
Wafer ID	The wafer ID as listed in the defect file.
Inspection	The date and time the site list was created during inspection.
Site Count	The number of defect sites in the site list.

Figure 4K

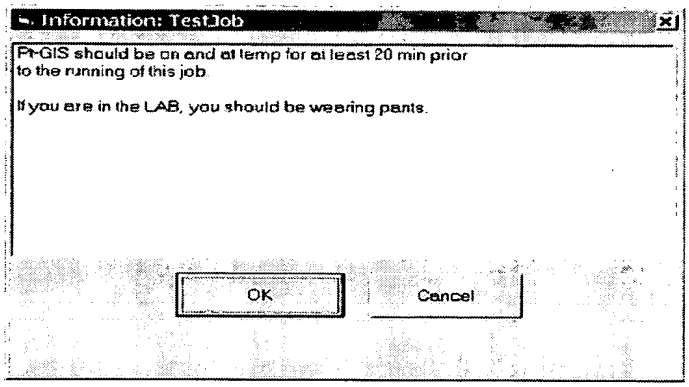


Figure 4L

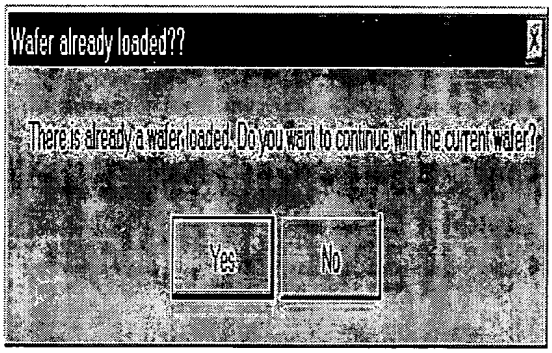


Figure 4M

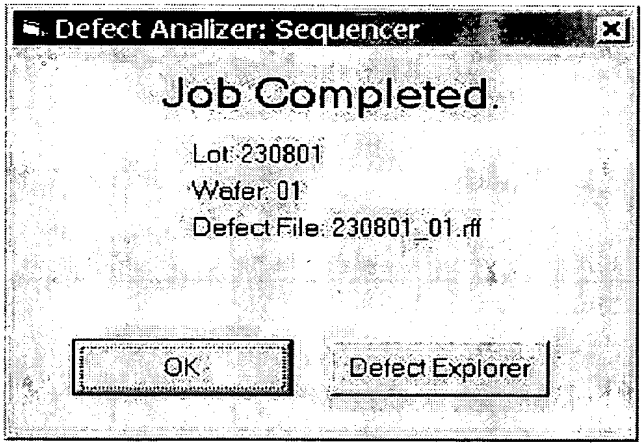


Figure 4N

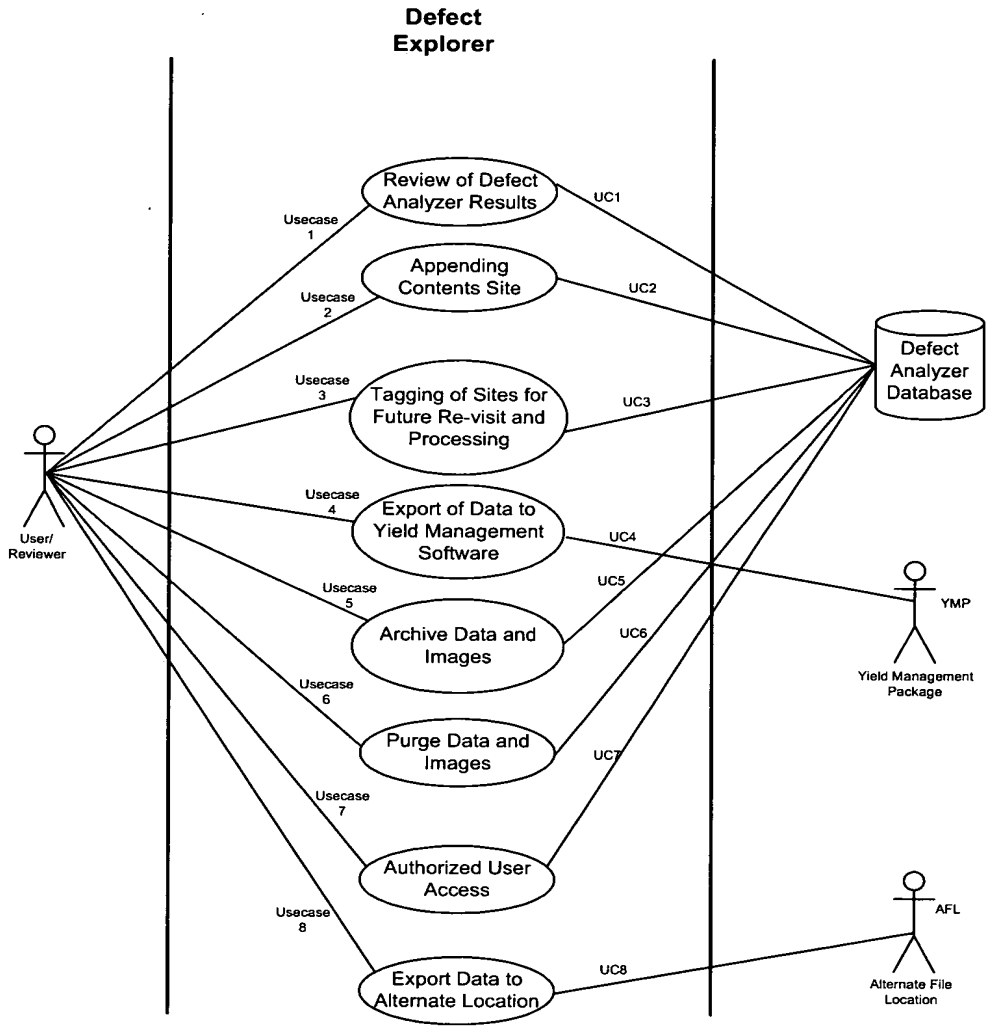

Defect Explorer
Review of Defect Analyzer Results
Appending Contents Site
Tagging of Sites for Future Re-visit and Processing
Export of Data to Yield Management Software
Archive Data and Images
Purge Data and Images
Authorized User Access
Export Data to Alternate Location
Usecase 1
Usecase 2
Usecase 3
Usecase 4
Usecase 5
Usecase 6
Usecase 7
Usecase 8
UC1
UC2
UC3
UC4
UC5
UC6
UC7
UC8
User/ Reviewer
Defect Analyzer Database
YMP
Yield Management Package
AFL
Alternate File Location

Figure 5

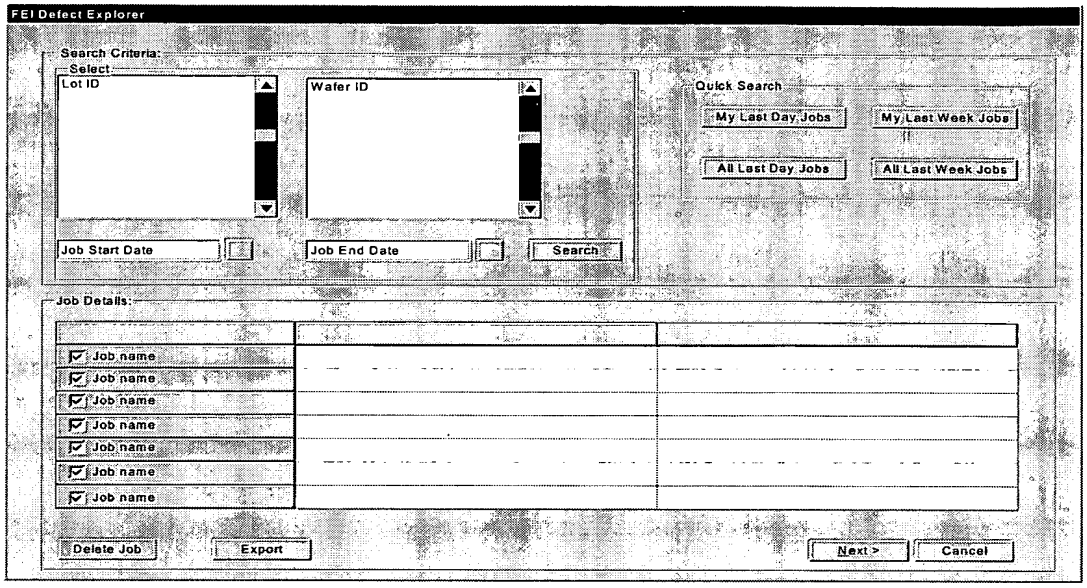


Figure 6A

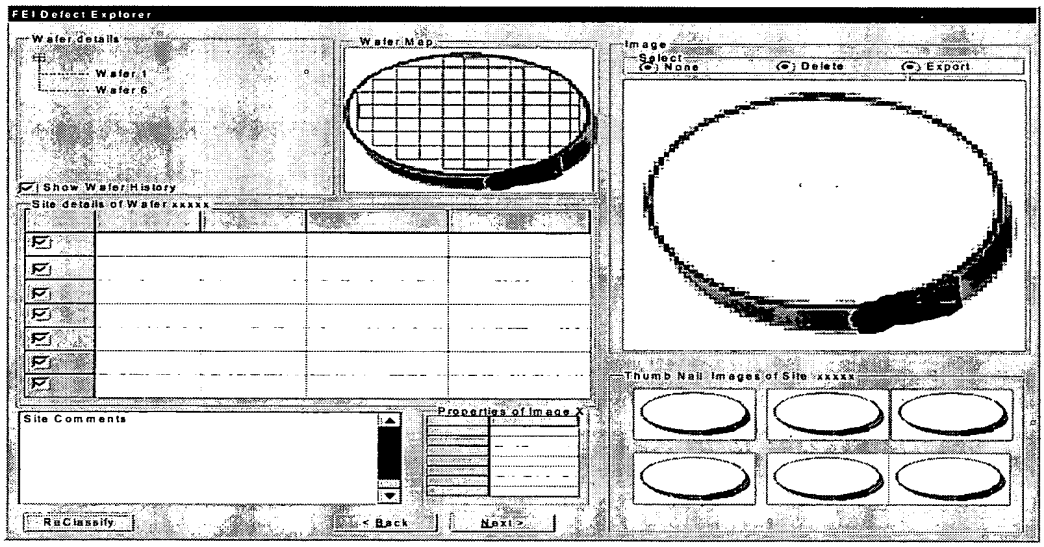


Figure 6B

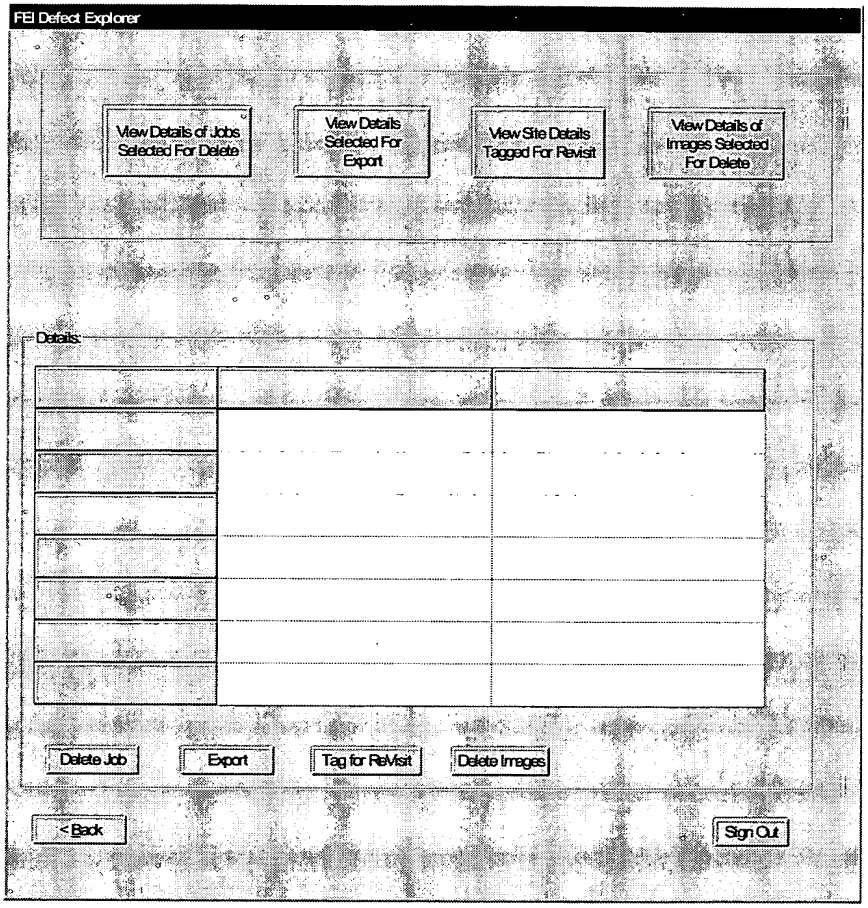

FEI Defect Explorer
View Details of Jobs Selected For Delete
View Details Selected For Export
View Site Details Tagged For Revisit
View Details of Images Selected For Delete
Details:
Delete Job
Export
Tag for ReVisit
Delete Images
< Back
Sign Out

Figure 6C

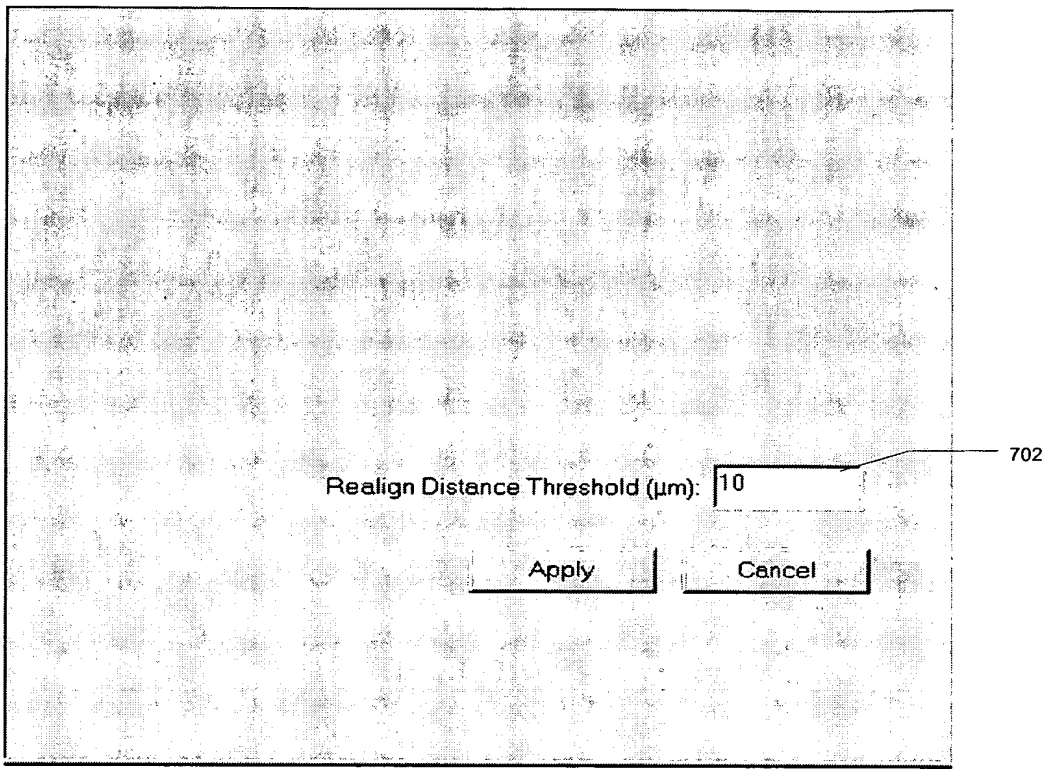


Figure 7A

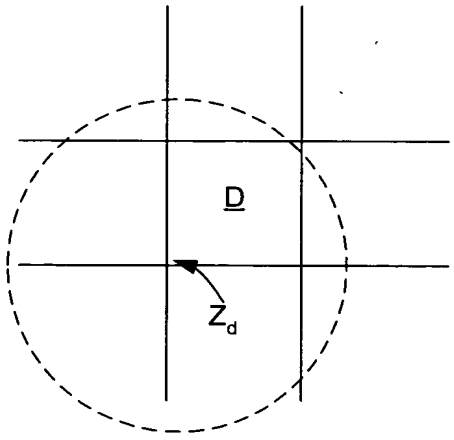


Figure 7B

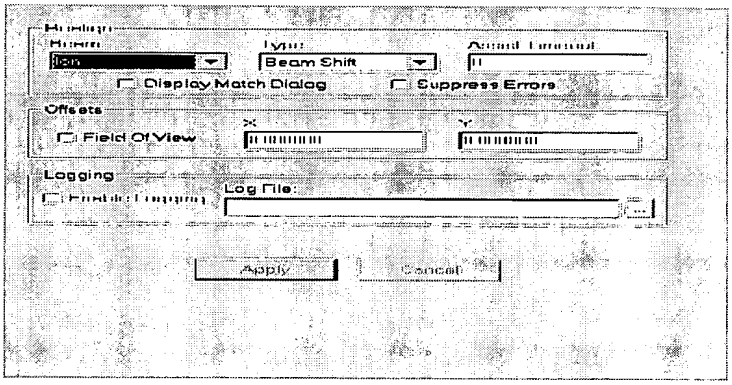


Figure 8A

Item	Description
Realign:	
Beam	Specifies the beam to be used in the alignment.
Type	Specifies measurement or the type of alignment. BEAM SHIFT specifies an alignment using beam shift. MEASURE instructs the system to measure the X, Y distance between the center of the image and the center of the fiducial mark, in pixels and microns. The result is written to the user-specified log file. STAGE MOVE specifies an alignment using a stage move.
Assist Timeout	Number of seconds a dialog box remains on screen, prompting for user intervention. If this value is 0, no dialog box appears.
Display Match Dialog	Displays the Image Match dialog box (see Image Match).
Suppress Errors	When this option is selected, the system ignores image recognition errors. If ENABLE LOGGING is selected, image recognition errors are written to the user-specified log file.
Offsets:	
Field of View	Specifies a proportional shift of the field of view. When this option is selected, the system shifts the field of view by the proportion of the field of view specified in X and Y. When this option is not selected, the system shifts the field of view by the distance in microns specified in X and Y.
X, Y	Specify the distance by which the system shifts the field of view during alignment. When FIELD OF VIEW is selected, the values specified in X and Y denote a portion of the field of view—e.g., a value of 0.1 equals 10% of the field of view. In one embodiment, acceptable values are 0–1. When FIELD OF VIEW is not selected, the system shifts the field of view by the distance in microns specified in X and Y.
Logging:	
Enable Logging	When this option is selected and a log file is specified, the system logs the following information: Name and path of the image file used for realignment X location of the fiducial in pixels and microns Y location of the fiducial in pixels and microns When MEASURE is selected for TYPE, the X, Y distance between the center of the image and the center of the fiducial mark, in pixels and microns. If the fiducial is not found, the system writes "Fail" to the log file.
Log File	Name and path of the specified log file. Use the adjacent Browse button to navigate to the desired directory.

Figure 8B

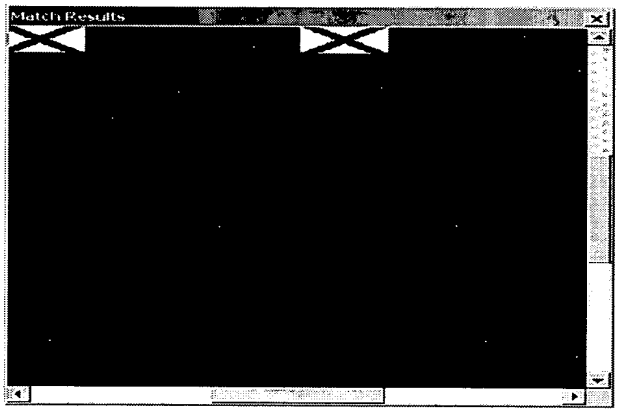


Figure 8C

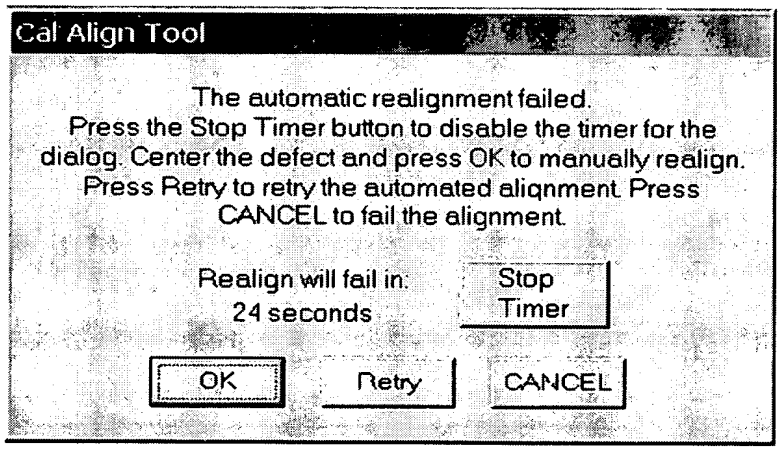


Figure 8D

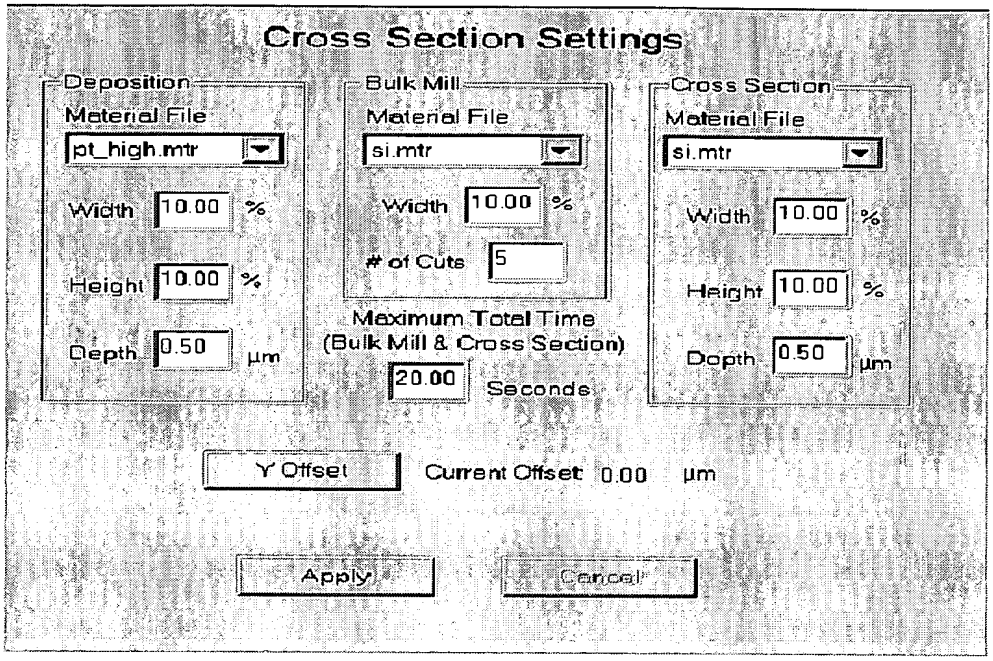


Figure 9A

Item	Description
Deposition:	
Material File	Displays a dropdown menu for selecting a material file (.mtr). The list contains an entry for every material file available on the system.
Width	Width of the specified cross section (X), as a percentage of the field of view.
Height	Height of the specified cross section (Y), as a percentage of the field of view. The protective coat will be centered about the location of the cross-section target line.
Depth	Depth of the specified cross section, in microns.
Bulk Mill:	
Number of Cuts	Number of cuts to be made in the bulk mill.
Cross Section:	As in Deposition group, above.
Maximum Total Time	Sets the total pattern time for the bulk mill and cross-section patterning. Defect Analyzer uses this value to select the apertures used for bulk milling and cross-sectioning, based on the specified pattern area, depth, and material file.
Y Offset	Displays a horizontal yellow line in the image quadrant, marking the desired upper boundary of the cross section. Click anywhere in the field of view to set the location of this yellow line, then click OK in the accompanying dialog box. For further information, see "Setting Y Offset" on page 4-14.

Figure 9B

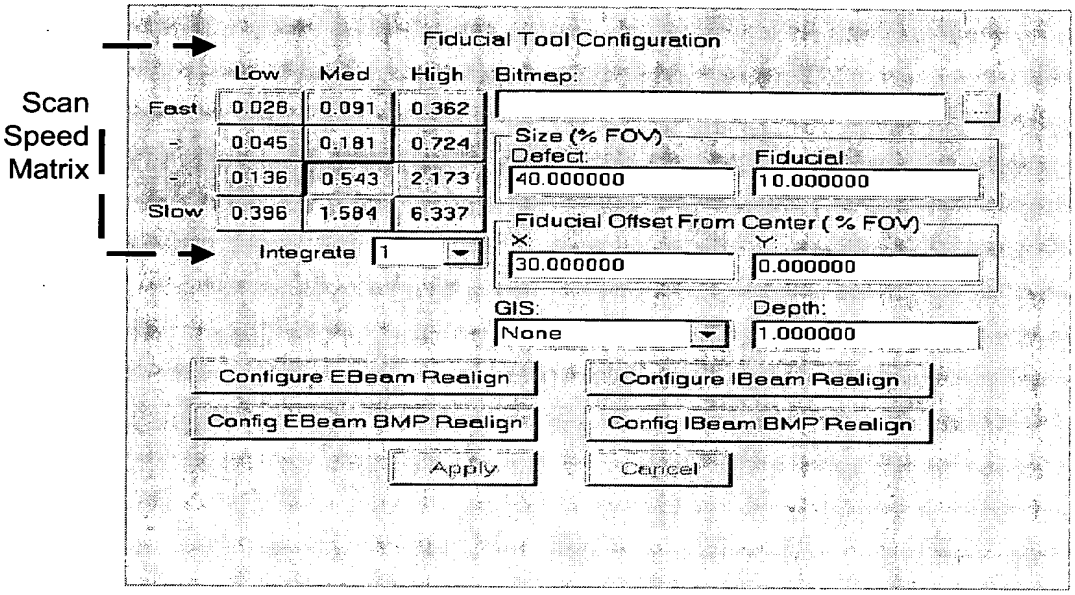


Figure 10A

Item	Description
Scan speed matrix	Sets the frame time and resolution used in ion beam and electron beam images collected after milling of the fiducial mark. These images are used for subsequent image recognition.
Integrate	Sets the number of frames to be integrated to allow accumulative noise reduction.
Bitmap	Defect Analyzer converts the specified bitmap to a stream file, based on the grayscale levels of individual pixels in the bitmap. Pixels above the median brightness in the grayscale are omitted from the stream file; pixels below the median brightness are converted to points.
Size (%FOV)	
Defect	Proportion of the field of view to be occupied by the defect.
Fiducial	Size of the fiducial mark, as a percentage of the field of view.
Fiducial Offset From Center (%FOV)	Sets the offset between the center of the image and the center of the fiducial mark, in X and Y, as a percentage of the field of view.
GIS	Selects the GIS to be used in milling the fiducial. The list contains an entry for every beam chemistry available on the system.
Depth	Depth of the fiducial mark, in microns.
Configure EBeam Realign Configure IBeam Realign Configure IBeam BMP Realign, Configure EBeam BMP Realign	CONFIGURE EBEAM BMP REALIGN and CONFIGURE IBEAM BMP REALIGN configure the image recognition software for initial matches between a fiducial mark and the bitmap used as the milling pattern.

Figure 10B

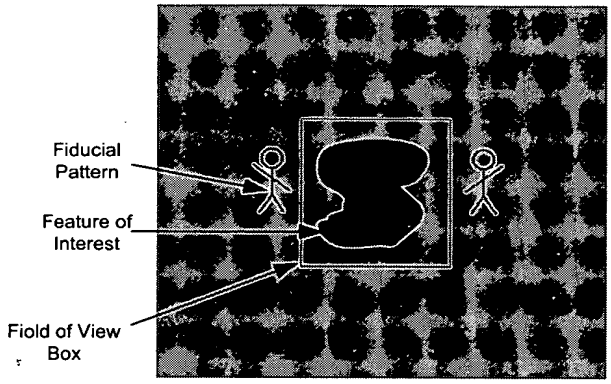


Figure 10C

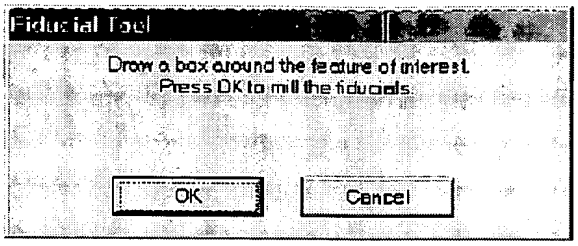


Figure 10D

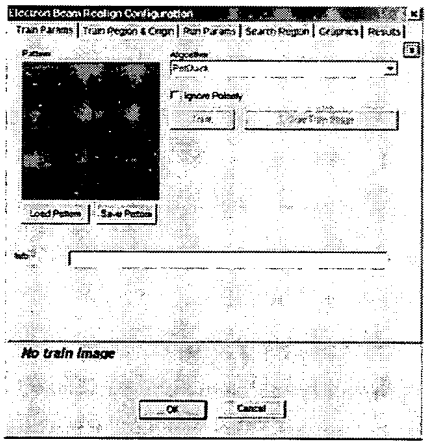


Figure 10E

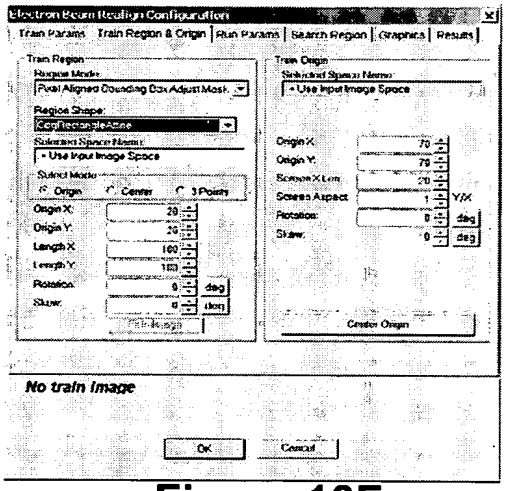


Figure 10F

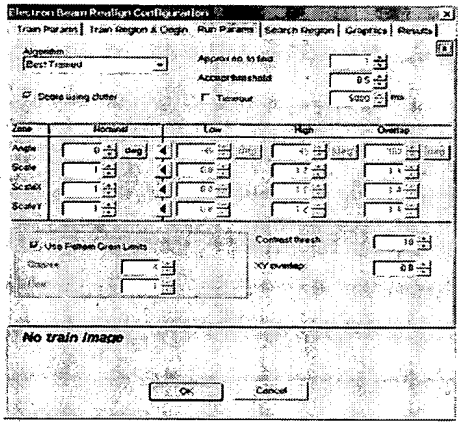


Figure 10G

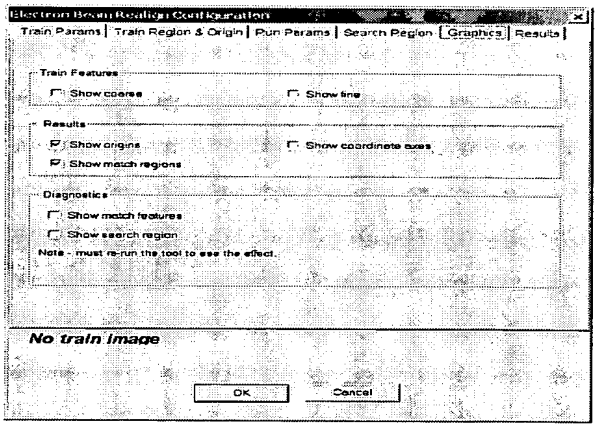


Figure 10H

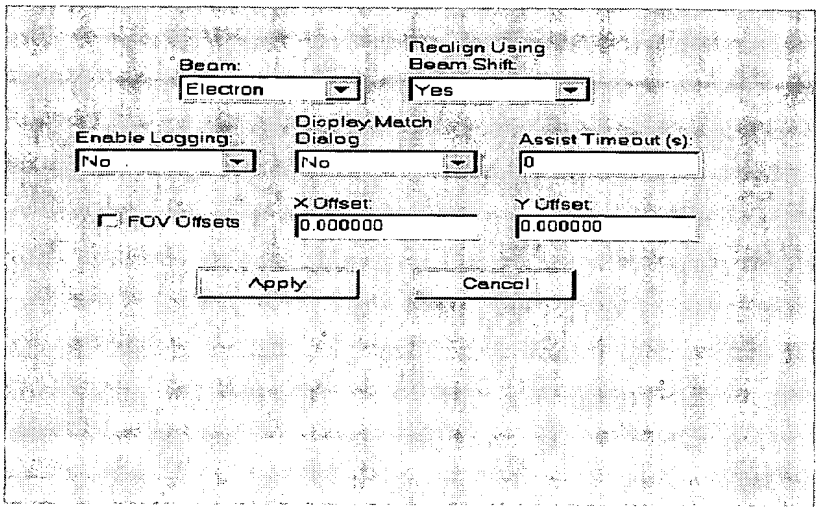


Figure 11A

Item	Description
Beam	Specifies the beam to be used in the alignment.
Realign Using Beam Shift	Specifies the type of alignment to be made. YES specifies an alignment made using beam shift. NO specifies an alignment made using a stage move. For best results, realign the electron beam with stage moves and the ion beam with beam shift.
Enable Logging	When this option is selected, the system logs the following information: Name and path of the image file used for realignment X location of the fiducial in pixels and microns Y location of the fiducial in pixels and microns If the fiducial is not found, the system writes "Fail" to the log file.
Display Match Dialog	Displays the Image Match dialog box (see "Image Match" on page 4-10).
Assist Timeout(s)	Number of seconds before a dialog box appears, prompting for user intervention. If this value is 0, no dialog box appears.
FOV Offset	Specifies a proportional shift of the field of view. When this option is selected, the system shifts the field of view by the proportion of the field of view specified in X and Y. When this option is not selected, the system shifts the field of view by the distance in microns specified in X and Y.
X Offset, Y Offset	Specify the distance by which the system shifts the field of view during alignment. When FIELD OF VIEW is selected, the values specified in X and Y denote a portion of the field of view—e.g., a value of 0.1 equals 10% of the field of view. Acceptable values are 0–1. When FIELD OF VIEW is not selected, the system shifts the field of view by the distance in microns specified in X and Y.

Figur 11B

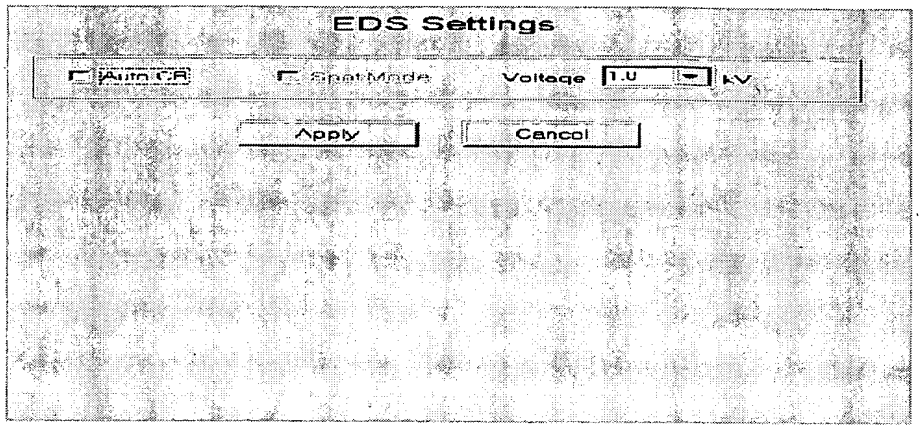


Figure 12A

Item	Description
Auto CB	Performs automatic contrast and brightness.
Spot Mode	Selects Spot as the scanning mode.
Voltage	Voltage to be used to acquire spectrum.

Figure 12B

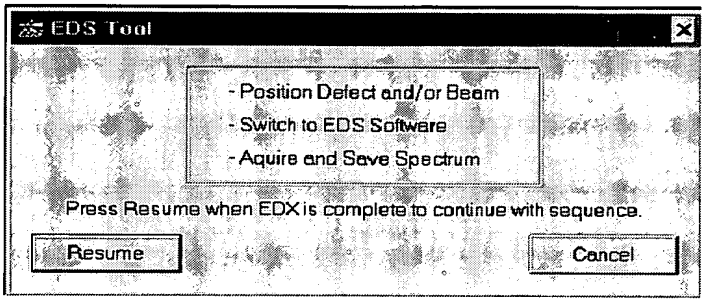


Figure 12C

Interface items	Description
Resume	Associates the spectrum with the current site and continues automated processing.
Cancel	Does not put anything into the database and gives you the option to fail the site.

Figure 12D

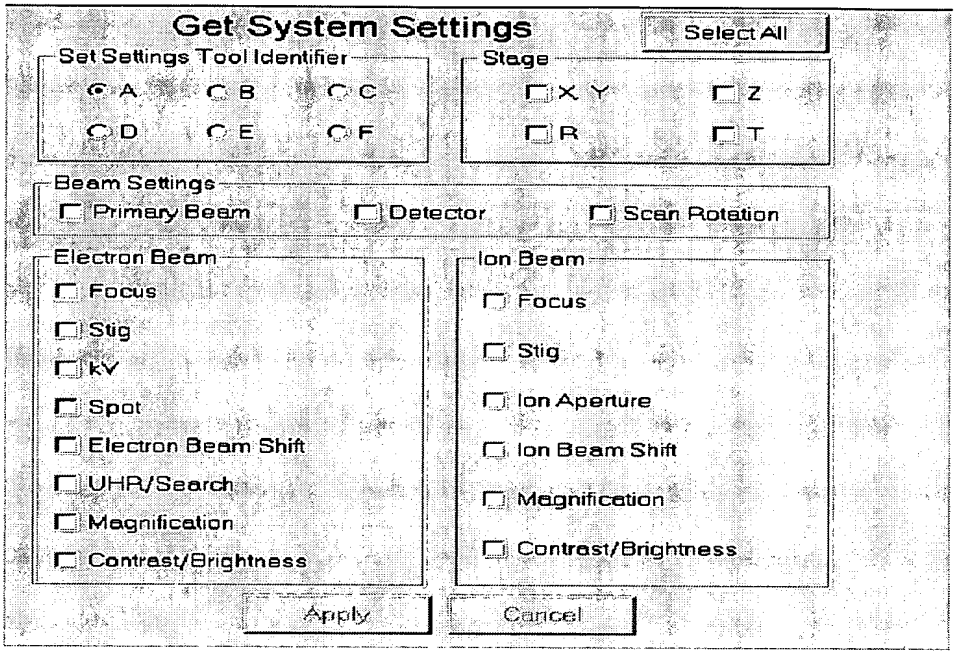


Figure 13A

Item	Description
Select All/De-Select All	Selects or deselects every option in the Stage, Beam Settings, Electron Beam, and Ion Beam groups.
Set Settings Tool Identifier	Identifies a set of stored settings.
Stage	Contains options for recording the positions of the five independent axes.
Beam Settings	Contains options for recording the following current beam settings:
Primary Beam	
Detector	
Scan Rotation	
Electron Beam	Contains options for recording the current electron beam parameters: Focus, Stigmation, Accelerating voltage (kV), Spot size, Beam shift, Mode (UHR or Search), Magnification, Contrast/Brightness
Ion Beam	Contains options for recording the current electron beam parameters: Focus, Stigmation, Aperture, Beam shift, Magnification, Contrast/Brightnes

Figure 13B

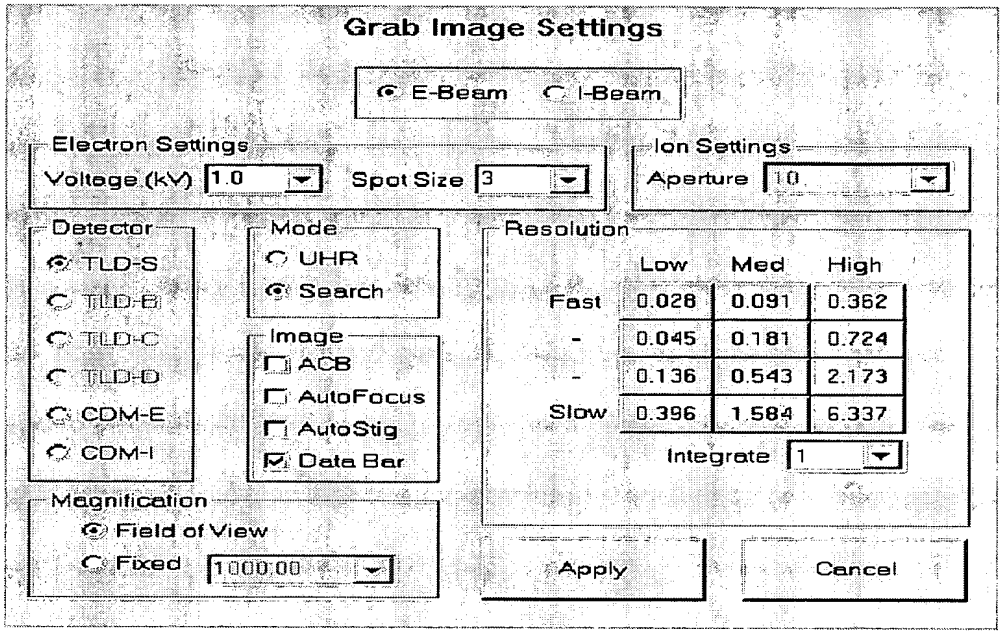


Figure 13C

Item	Description
E-Beam	Use electron beam to grab an image.
I-Beam	Use ion beam to grab an image.
Electron Settings:	
Voltage (kV)	Active only for the electron beam. Specify the accelerating voltage.
Spot Size	Active only for the electron beam. Specify the spot size.
Detector	Select the detector used to collect the image. Available selections are dependent on the selected mode and beam. Refer to the xP DualBeam Workstation User's Guide (PN 25417) for information about detector types.
Mode	Active only for the electron beam. Select Search mode for low magnifications and UHR mode for higher magnifications.
Image:	
ACB	Automatically adjusts contrast and brightness using the stored values for comparison.
AutoFocus	Automatically corrects the focus, based on the system sharpness criteria.
AutoStig	Automatically corrects sigmatism, based on the system sharpness criteria. Available for the electron beam.
Data Bar	Save the databar as seen into the image.
Magnification	Specifies the magnification used to grab the image. Select either the field-of-view (determined by the Fiducial tool) or choose from a range of preset magnifications.
Ion Aperture	Active only for the ion beam. Sets the ion aperture.
Resolution	Selects the scan rate and resolution for grabbing a single frame. The values are those available for Grab Image.
Integrate	Specifies the number of collected images to be summed to generate the final image.

Figure 13D

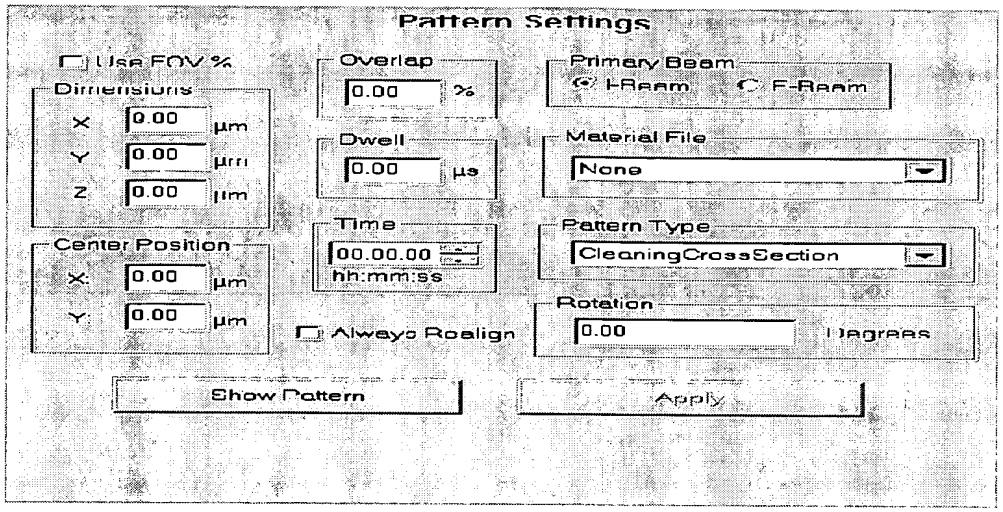


Figure 14A

Item	Description
Use FOV %	Converts X and Y coordinates in Dimensions and Center Position to a percentage of the field of view. When this option is selected, X and Y coordinates in Dimensions and Center Position denote a percentage of the field of view. When this option is not selected, X and Y coordinates in Dimensions and Center Position are in microns.
Dimensions	Sets the X, Y, and Z pattern dimensions. When Pattern Type is set to Circle, X and Y are replaced by Rin (inner radius) and Rout (outer radius).
Center Position	Shows the stage X and Y coordinates of the center of the pattern relative to the center of the field of view.
Overlap	Beam overlap. Not available when a material file is selected.
Dwell	Dwell time per pixel. Not available when a material file is selected.
Time	Time for milling displayed as either hh:mm:ss or ss:ttt.
Always Realign	When this option is selected, the system always realigns to the fiducial mark before milling the specified pattern. When this option is selected, the system only realigns to the fiducial mark when an aperture has changed or a GIS needle has been inserted.
Show Pattern/ Remove Pattern	Displays the currently defined pattern. When a pattern is already on screen, removes that pattern.
Primary Beam	Select I-BEAM or E-BEAM as the beam that will be used for patterning.
Material File	Select the material file for your application. Refer to the xP DualBeam Workstation User's Guide (PN 25417) for information about material files.
Pattern Type	Defines the pattern. Refer to the xP DualBeam Workstation User's Guide (PN 25417) for information about available patterns.
Rotation	Rotates the pattern about its center to the specified angle.

Figure 14B

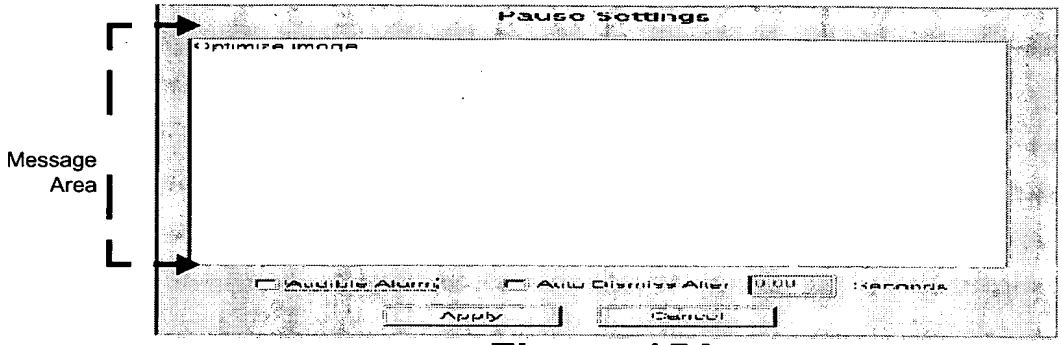


Figure 15A

Item	Description
Message area	Defines actions the user should take before continuing processing.
Audible alarm	Causes an alarm to sound when the Pause dialog box displays during a job.
Auto dismiss	Selects if the Pause dialog box should time out. Otherwise, the Pause dialog box must be manually dismissed. The number of seconds specifies the fixed amount of time Pause dialog box is displayed during a job.

Figure 15B

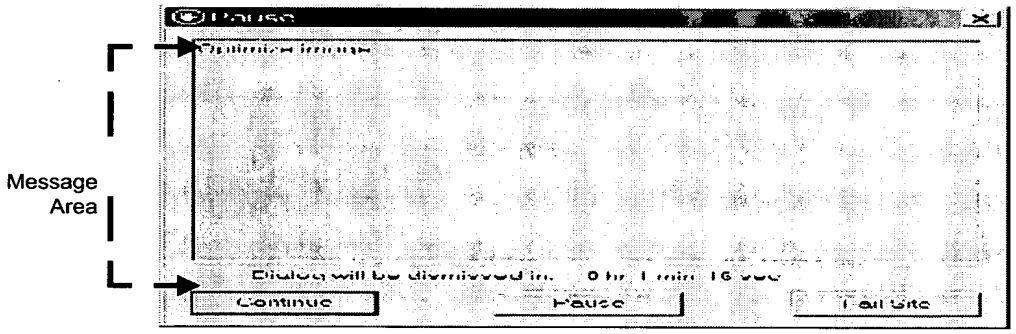


Figure 15C

Item	Description
Message area	Defines action operator should take before proceeding with the process. The text cannot be modified during runtime.
Timeout clock	The time the dialog box will be displayed during a job. If the operator does not interact with the tool, the Pause dialog box times out as specified and the process automatically continues.
Continue	Click to continue processing the current site. The site list grid will show that the site passed.
Pause/Resume	Stops/restarts the timer. (This button is inactive if AUTO DISMISS was not selected during configuration.) The process waits for the operator to click either CONTINUE or FAIL.
Fail Site	Click to fail the current site. Further processing at the site is aborted. Processing starts at the next site. The site list grid will show that the site failed. If the entire job is to be aborted, the operator can click ABORT in the Run Tool Sequence dialog box.

Figure 15D

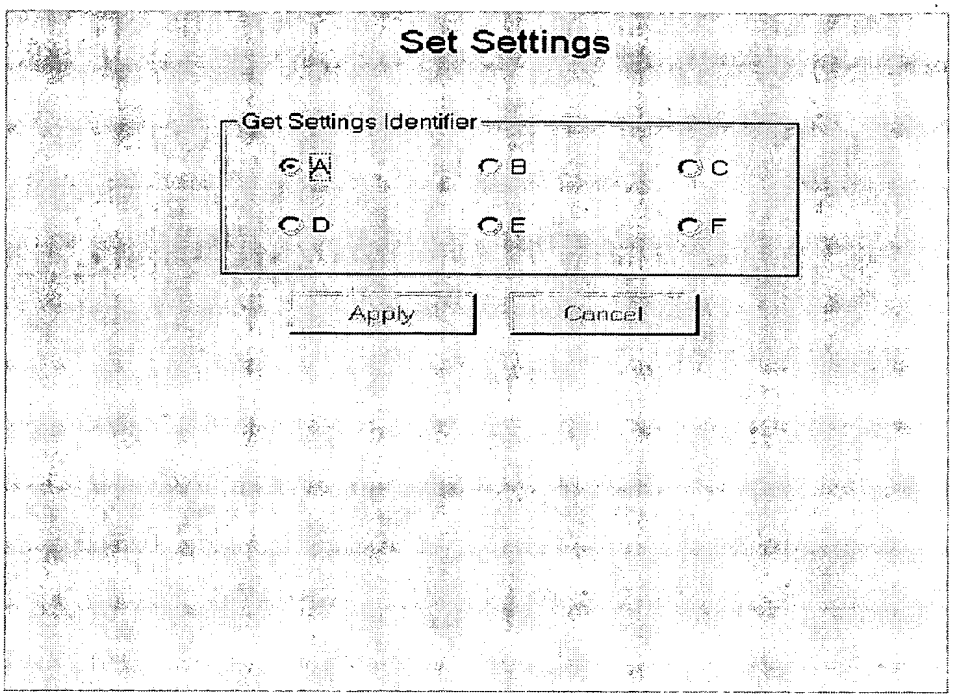


Figure 16

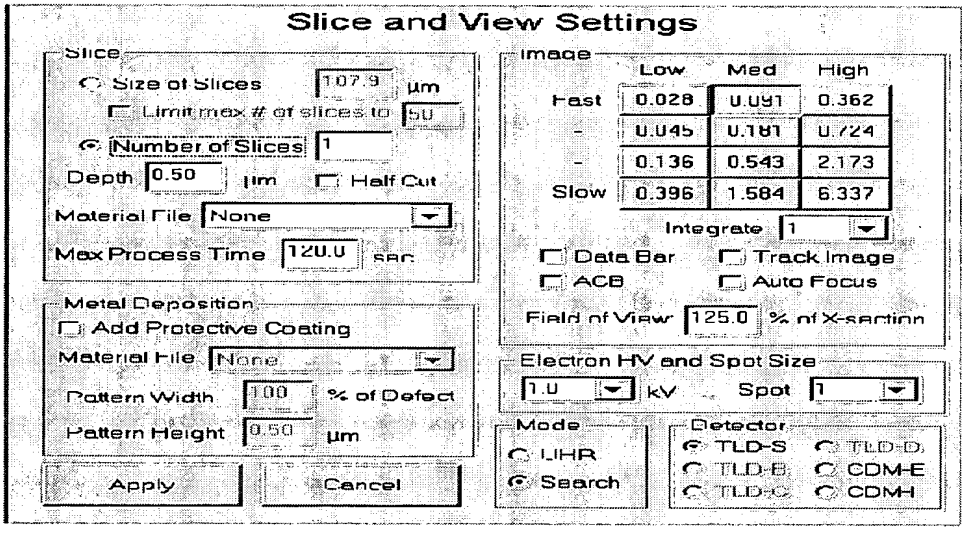


Figure 17A

Item	Description
Slice:	User selects either SIZE OF SLICES or NUMBER OF SLICES.
Size of Slices	Specifies the slice size in microns. The number of slices to be milled will be calculated by dividing the size of the defect (determined by Fiducial tool) by the size of the slices.
Limit max # of slices to	The maximum number of slices to be made in the Slice and View area.
Number of Slices	Specifies the number of slices to be milled. The height of each slice is determined by the software dividing the value specified for height (y) by the number of slices. Where is height from? A maximum of 100 individual patterns can be displayed. If the tool calls for more than 100 slices, an outline indicating the overall area to be sliced is displayed.
Depth	Specifies the pattern depth in microns.
Half Cut	Mills only half way through the defect selected (up to the center cross).
Material File	Displays a dropdown list for selecting a material file (.mtr). The list contains an entry for every material file available on the system. The default material file is si.mtr.
Max Process Time	The maximum time process may occur
Metal Deposition:	
Add Protective Coating:	If this option is selected, a protective layer will be centered about the Slice and View area. The scale will be set in the job builder configuration and based upon the size of the slice and view area. If protective coating is not selected, the fields associated with it should be inactive.
Material File	Displays a dropdown list for selecting a material file (.mtr). The list contains an entry for every material file available on the system. The default material file is either pt_high.mtr.
Pattern Width	Specifies the pattern width, as a percentage of the defect size.
Pattern Height	Specifies the pattern height, in microns.
Image:	
Scan Speed Matrix	Sets the frame time and resolution used for the electron beam images of the cross-section face. These values correspond generally to the faster continuous scan rates available in xP. Refer to the xP DualBeam Workstation User's Guide for information about the available resolutions.
Integrate	Number of frames to integrate for accumulative noise reduction
Data Bar	Includes the databar configured in xP in the image.
ACB	Selects automatically adjusting contrast and brightness, using the stored values for comparison.
Track Image	Adjusts the electron beam shift to keep the face of the cross section centered in the field of view.
Auto Focus	Initiates automated focus before the system begins capturing electron beam images.
Field of View	Specifies the field of view used for electron beam images of the cross-section face, as a percentage of the cross-section.
Electron HV and Spotsize:	kV specifies the electron beam accelerating voltage. Select from the range of voltages available for the currently selected imaging mode. SPOTSIZE specifies the actual focused area of the electron beam on the sample.
Mode	Select UHR or Search as the imaging mode.
Detector	Select the detector to be used for the electron beam images. Choices are determined by the currently selected imaging mode.

Figure 17B

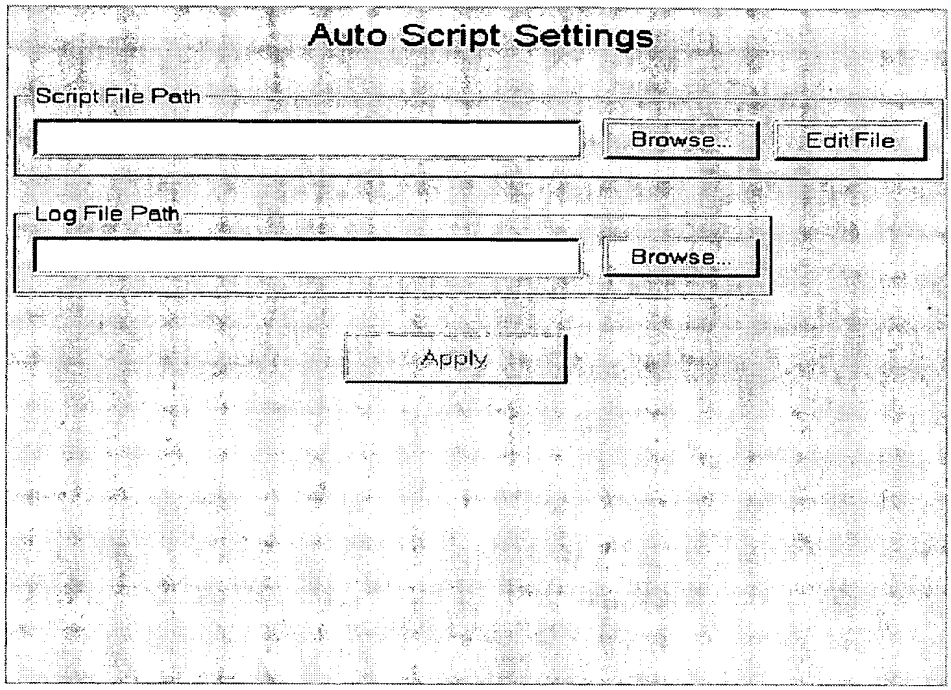


Figure 18A

Item	Description
Script File Path	Name and path of the AutoScript file.
Browse	Accesses the Open dialog box so you can navigate to a script file.
Edit File	Opens the selected script file in the Windows Notepad® text editor.
Log File Path	Name and path of the log file.
Browse	Accesses the Open dialog box so you can navigate to the log file.

Figure 18B

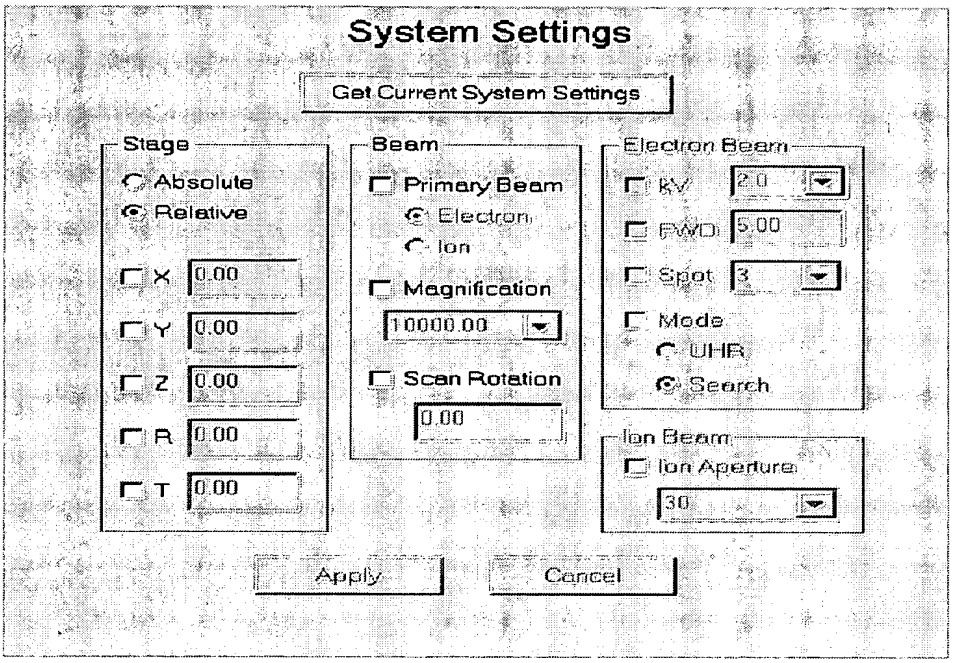


Figure 19A

Item	Description
GetCurrentSystemSetting	Gets the current system settings for all options.
Stage:	
Absolute	Chooses coordinates measured from the center of the stage.
Relative	Chooses coordinates measured from the current location on the stage.
X, Y, Z, R, T	Sets the positions of the five independent axes.
Beam:	
Primary Beam	Sets the ion beam or electron beam as the primary beam. The selected beam sets the magnification and other image data of the current image window.
Magnification	Sets magnification to the specified value.
Scan Rotation	Sets scan rotation to the specified value.
Electron Beam:	
kV	Sets the accelerating voltage for the electron beam. Choose a value from the adjacent dropdown list.
FWD	Sets the electron beam focus to the free working distance specified in the adjacent edit box.
Spot	Sets the aperture size for the electron beam. Choose a value from the adjacent dropdown list.
Mode	Selects the mode for the electron beam.
Ion Beam:	
Ion Aperture	Sets the ion beam current to the aperture (in pA) specified in the adjacent dropdown list.

Figure 19B

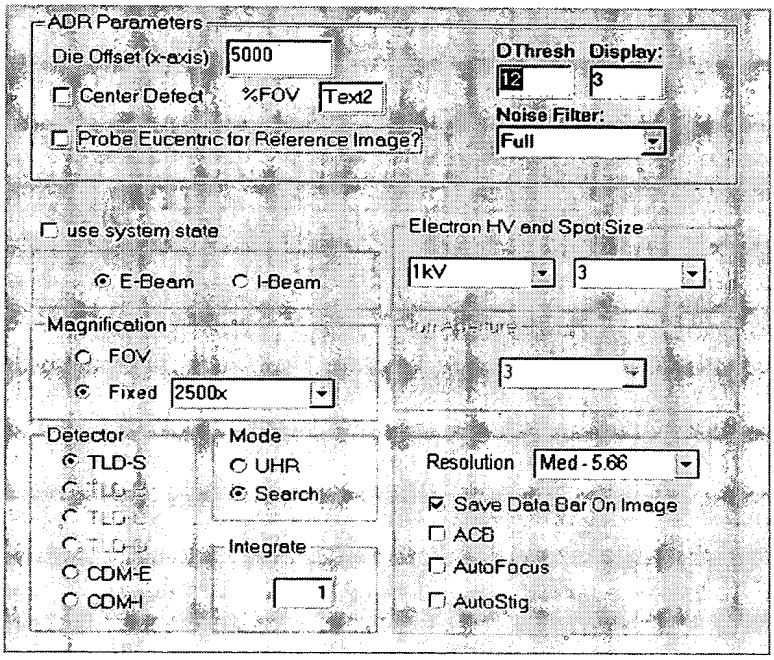

ADR Parameters
Die Offset (x-axis)
5000
DThresh
Display:
12
3
Center Defect
%FOV
Text2
Noise Filter:
Probe Eucentric for Reference Image?
Full
use system state
Electron HV and Spot Size
E-Beam
I-Beam
1kV
3
Magnification
FOV
Fixed
2500x
3
Detector
TLD-S
CDM-E
CDM-I
Mode
UHR
Search
Integrate
1
Resolution
Med - 5.66
Save Data Bar On Image
ACB
AutoFocus
AutoStig

Figure 20A

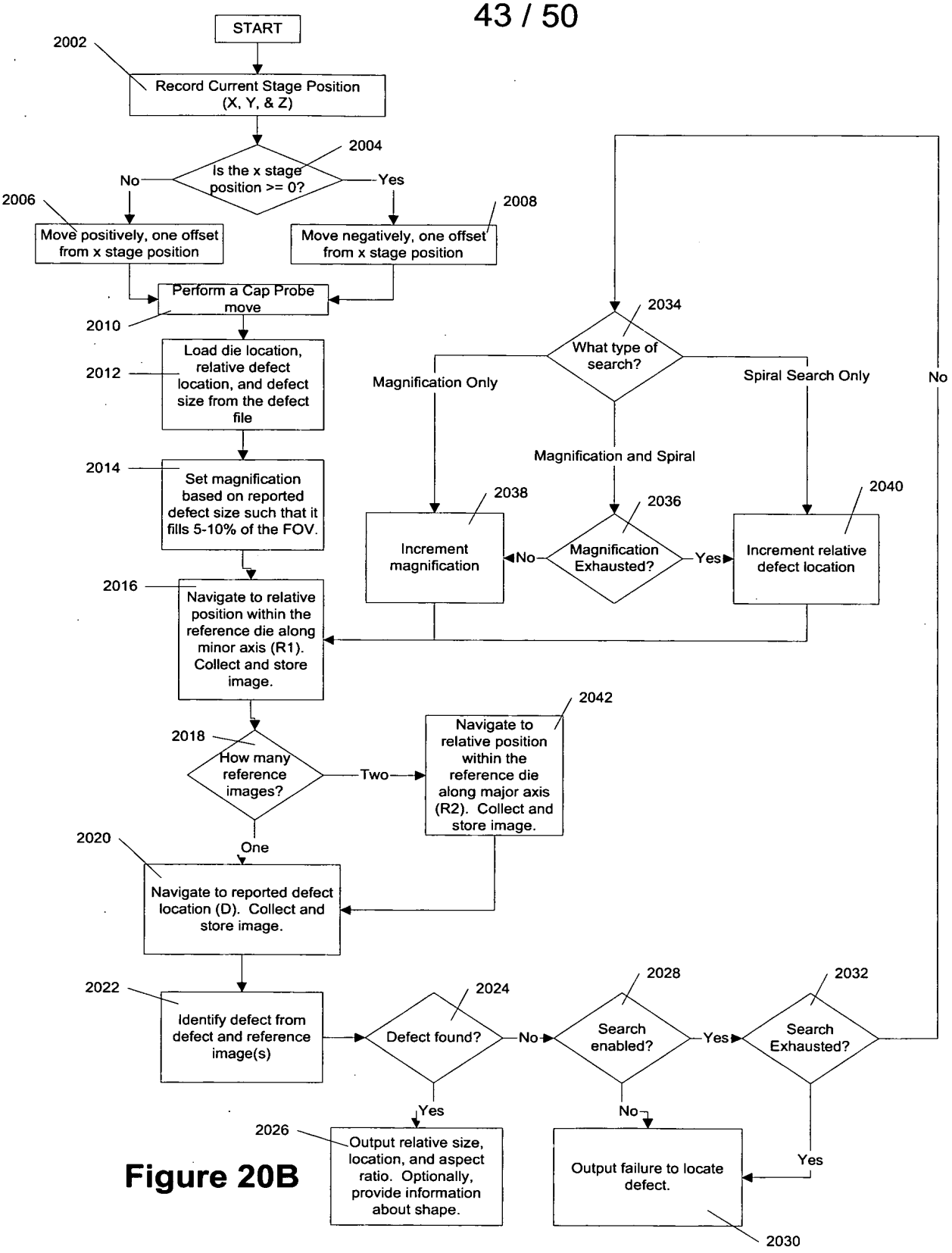

START
2002
Record Current Stage Position (X, Y, & Z)
2004
Is the x stage position >= 0?
No
Yes
2006
Move positively, one offset from x stage position
2008
Move negatively, one offset from x stage position
Perform a Cap Probe move
2010
2012
Load die location, relative defect location, and defect size from the defect file
2014
Set magnification based on reported defect size such that it fills 5-10% of the FOV.
2016
Navigate to relative position within the reference die along minor axis (R1). Collect and store image.
2018
How many reference images?
Two
One
2042
Navigate to relative position within the reference die along major axis (R2). Collect and store image.
2020
Navigate to reported defect location (D). Collect and store image.
2022
Identify defect from defect and reference image(s)
2024
Defect found?
Yes
No
2026
Output relative size, location, and aspect ratio. Optionally, provide information about shape.
2028
Search enabled?
Yes
No
2032
Search Exhausted?
Yes
No
Output failure to locate defect.
2030
2034
What type of search?
Magnification Only
Magnification and Spiral
Spiral Search Only
2038
Increment magnification
2036
Magnification Exhausted?
No
Yes
2040
Increment relative defect location

Figure 20B

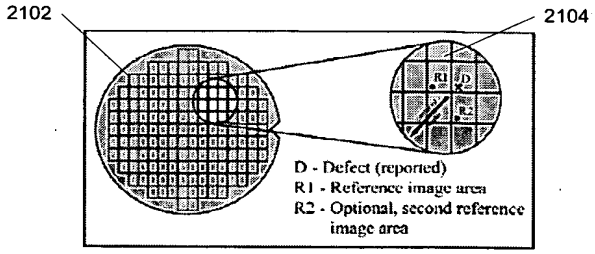


Figure 21

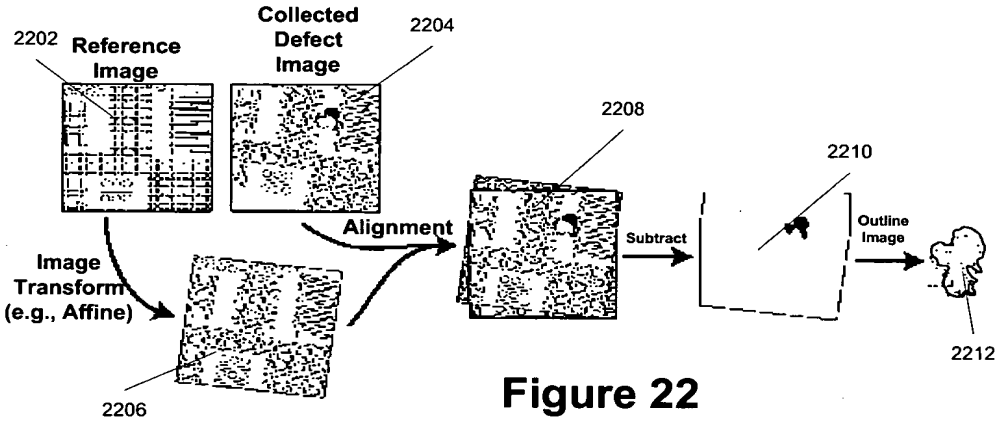


Figure 22

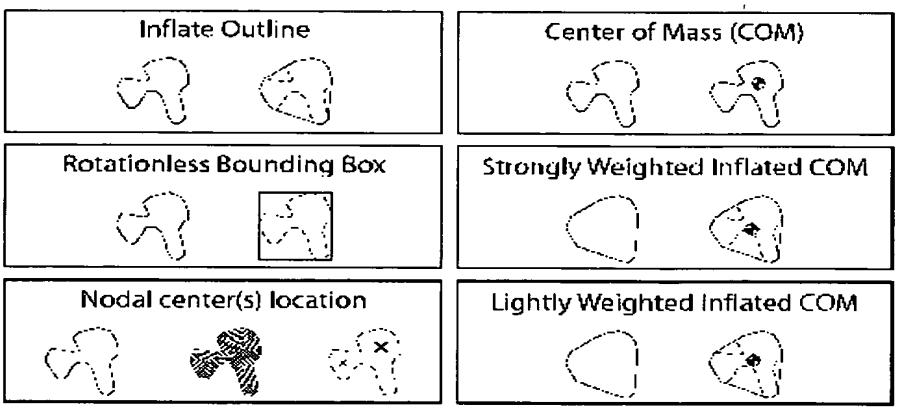


Figure 23A

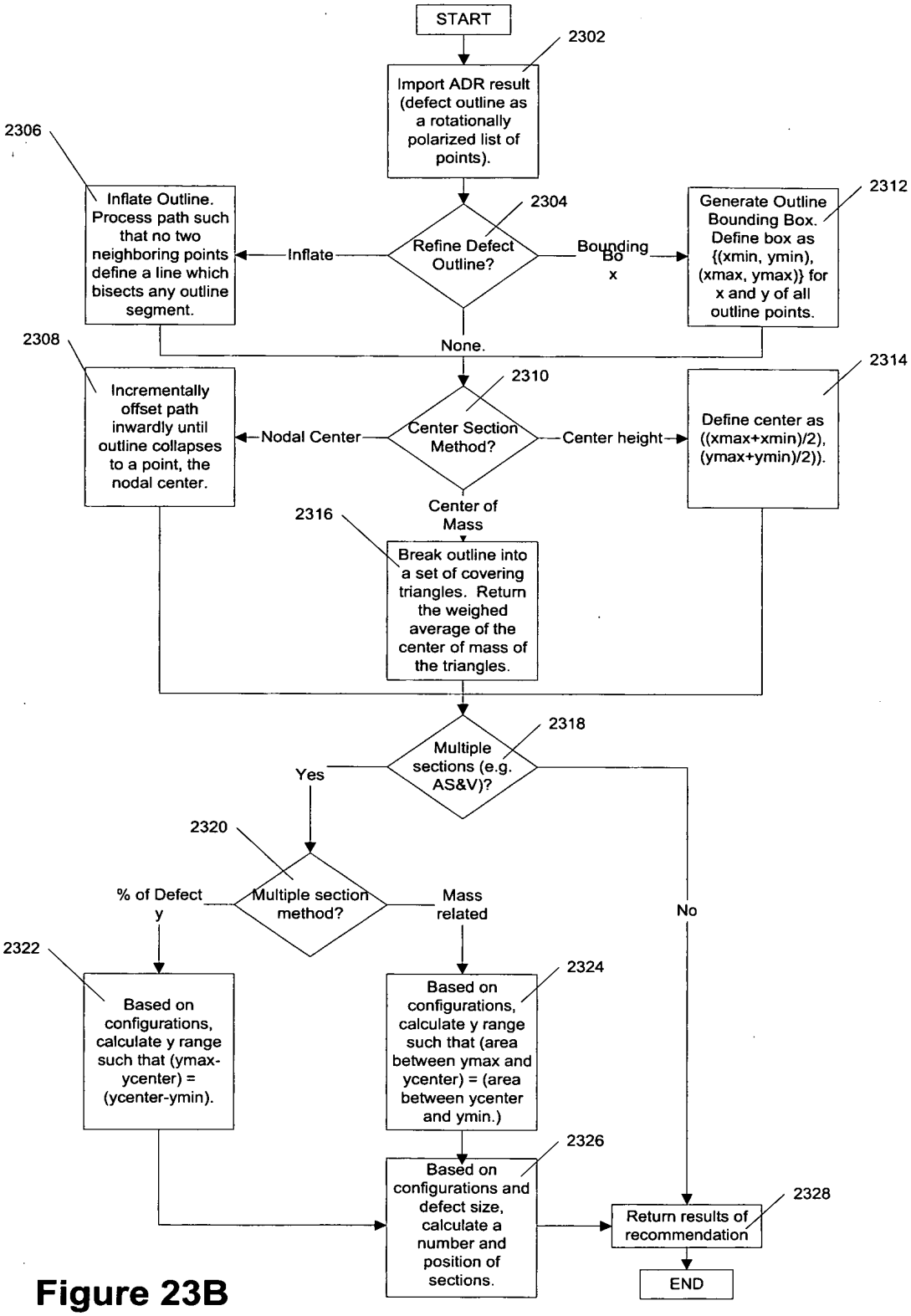

START
2302
Import ADR result (defect outline as a rotationally polarized list of points).
2306
Inflate Outline. Process path such that no two neighboring points define a line which bisects any outline segment.
Inflate
2304
Refine Defect Outline?
Bounding Box
2312
Generate Outline Bounding Box. Define box as {(xmin, ymin), (xmax, ymax)} for x and y of all outline points.
None.
2308
Incrementally offset path inwardly until outline collapses to a point, the nodal center.
Nodal Center
2310
Center Section Method?
Center height
2314
Define center as ((xmax+xmin)/2), (ymax+ymin)/2)).
Center of Mass
2316
Break outline into a set of covering triangles. Return the weighed average of the center of mass of the triangles.
2318
Multiple sections (e.g. AS&V)?
Yes
No
2320
Multiple section method?
% of Defect y
Mass related
2322
Based on configurations, calculate y range such that (ymax-ycenter) = (ycenter-ymin).
2324
Based on configurations, calculate y range such that (area between ymax and ycenter) = (area between ycenter and ymin.)
2326
Based on configurations and defect size, calculate a number and position of sections.
2328
Return results of recommendation
END

Figure 23B

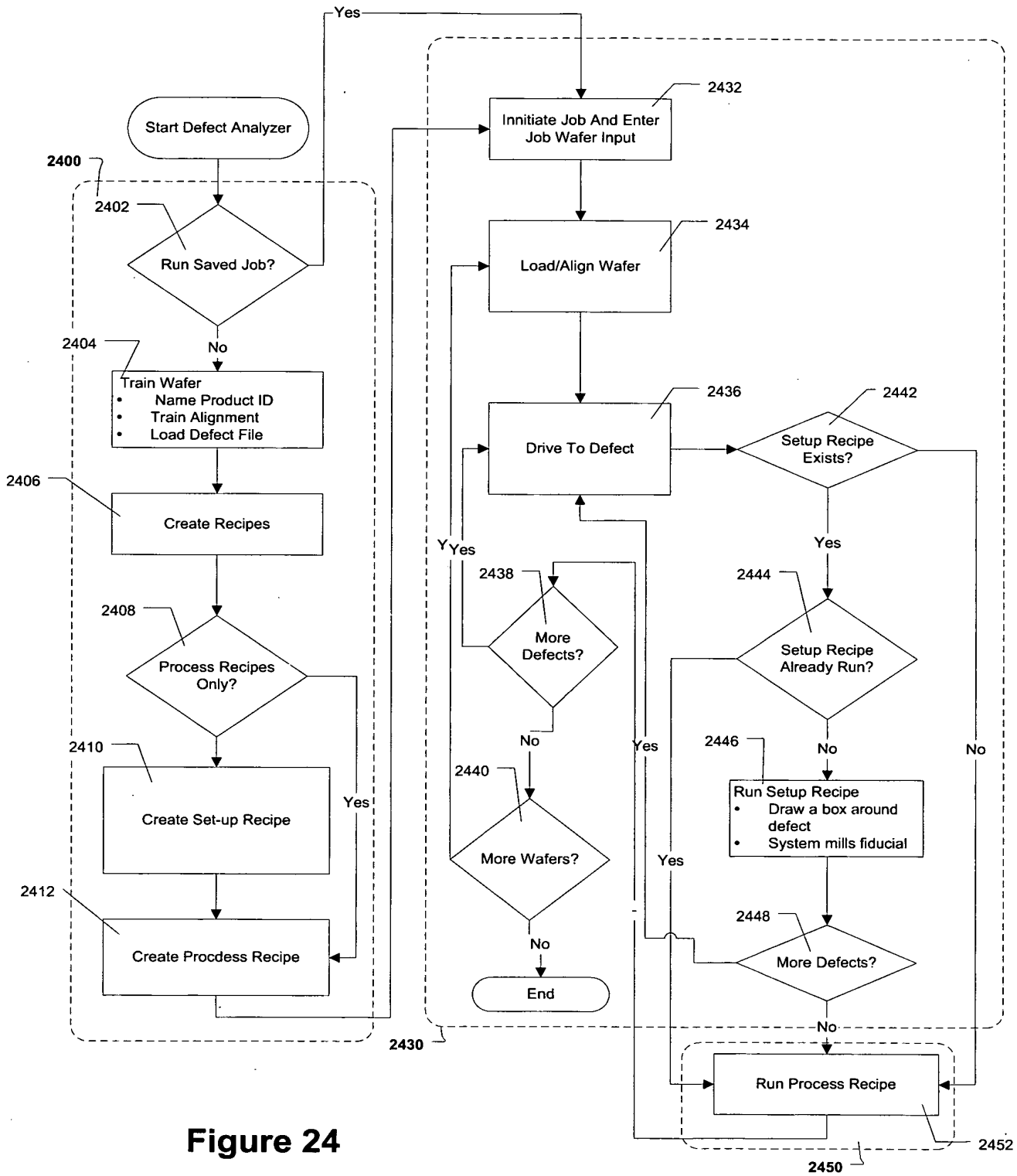

Start Defect Analyzer
2400
2402
Run Saved Job?
Yes
No
2404
Train Wafer
• Name Product ID
• Train Alignment
• Load Defect File
2406
Create Recipes
2408
Process Recipes Only?
Yes
2410
Create Set-up Recipe
2412
Create Procdess Recipe
2430
2432
Innitiate Job And Enter Job Wafer Input
2434
Load/Align Wafer
2436
Drive To Defect
2438
More Defects?
Yes
No
2440
More Wafers?
Yes
No
End
2442
Setup Recipe Exists?
Yes
No
2444
Setup Recipe Already Run?
Yes
No
2446
Run Setup Recipe
• Draw a box around defect
• System mills fiducial
2448
More Defects?
Yes
No
Run Process Recipe
2450
2452

Figure 24

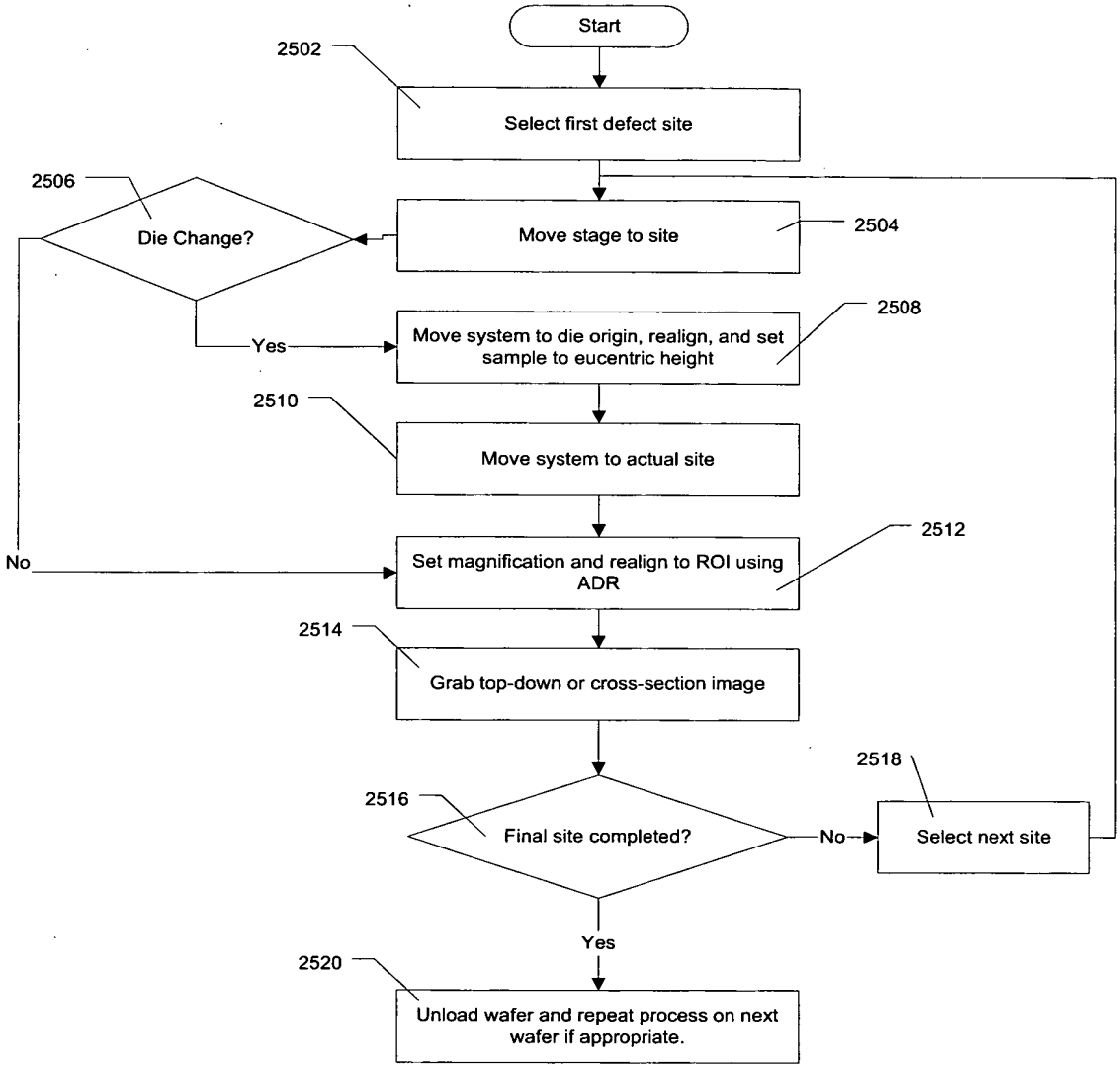

Start
2502
Select first defect site
2506
Die Change?
Move stage to site
2504
Yes
Move system to die origin, realign, and set sample to eucentric height
2508
2510
Move system to actual site
No
Set magnification and realign to ROI using ADR
2512
2514
Grab top-down or cross-section image
2518
2516
Final site completed?
No
Select next site
Yes
2520
Unload wafer and repeat process on next wafer if appropriate.

Figure 25

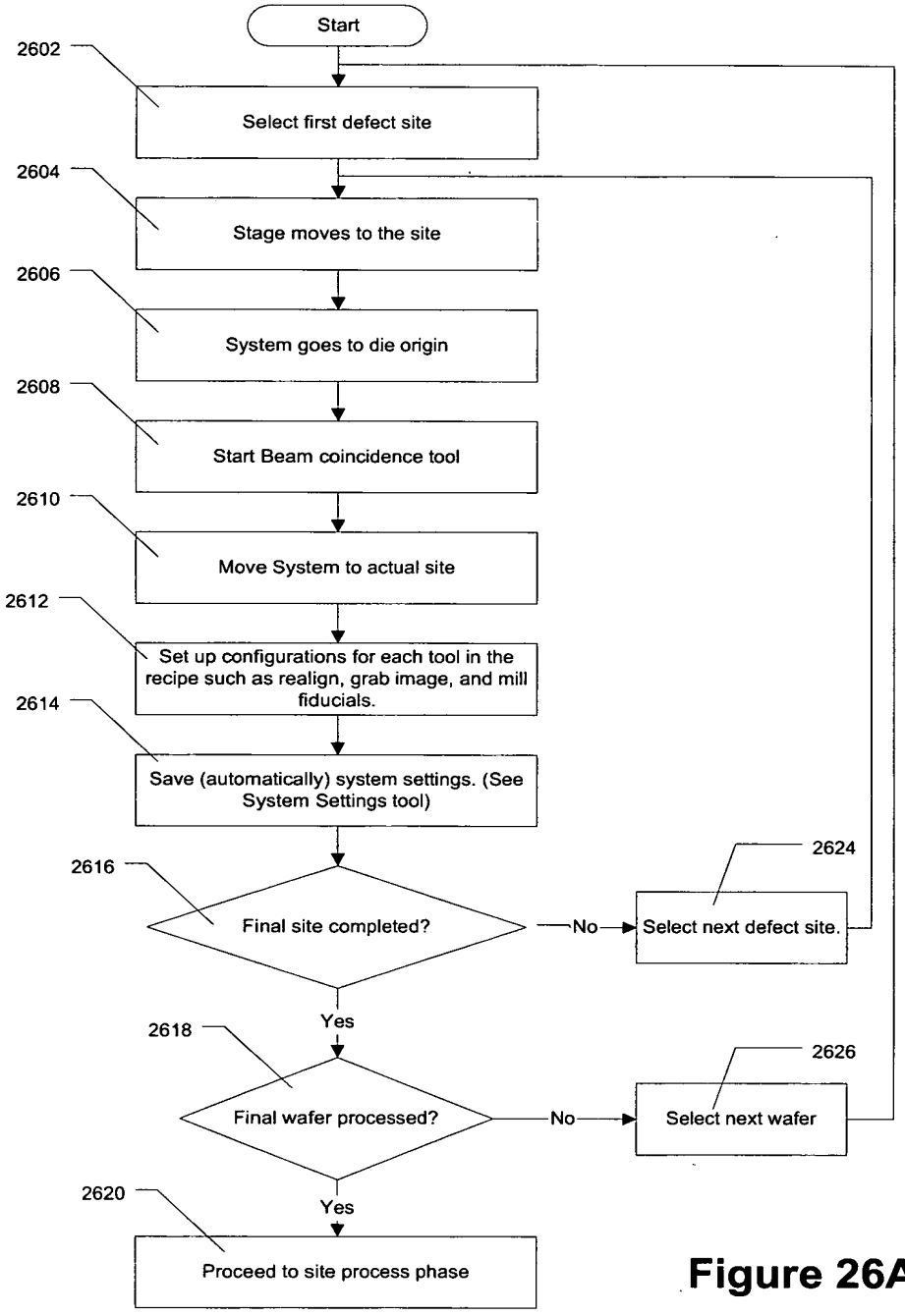

Start
2602
Select first defect site
2604
Stage moves to the site
2606
System goes to die origin
2608
Start Beam coincidence tool
2610
Move System to actual site
2612
Set up configurations for each tool in the recipe such as realign, grab image, and mill fiducials.
2614
Save (automatically) system settings. (See System Settings tool)
2616
Final site completed?
No
2624
Select next defect site.
Yes
2618
Final wafer processed?
No
2626
Select next wafer
Yes
2620
Proceed to site process phase

Figure 26A

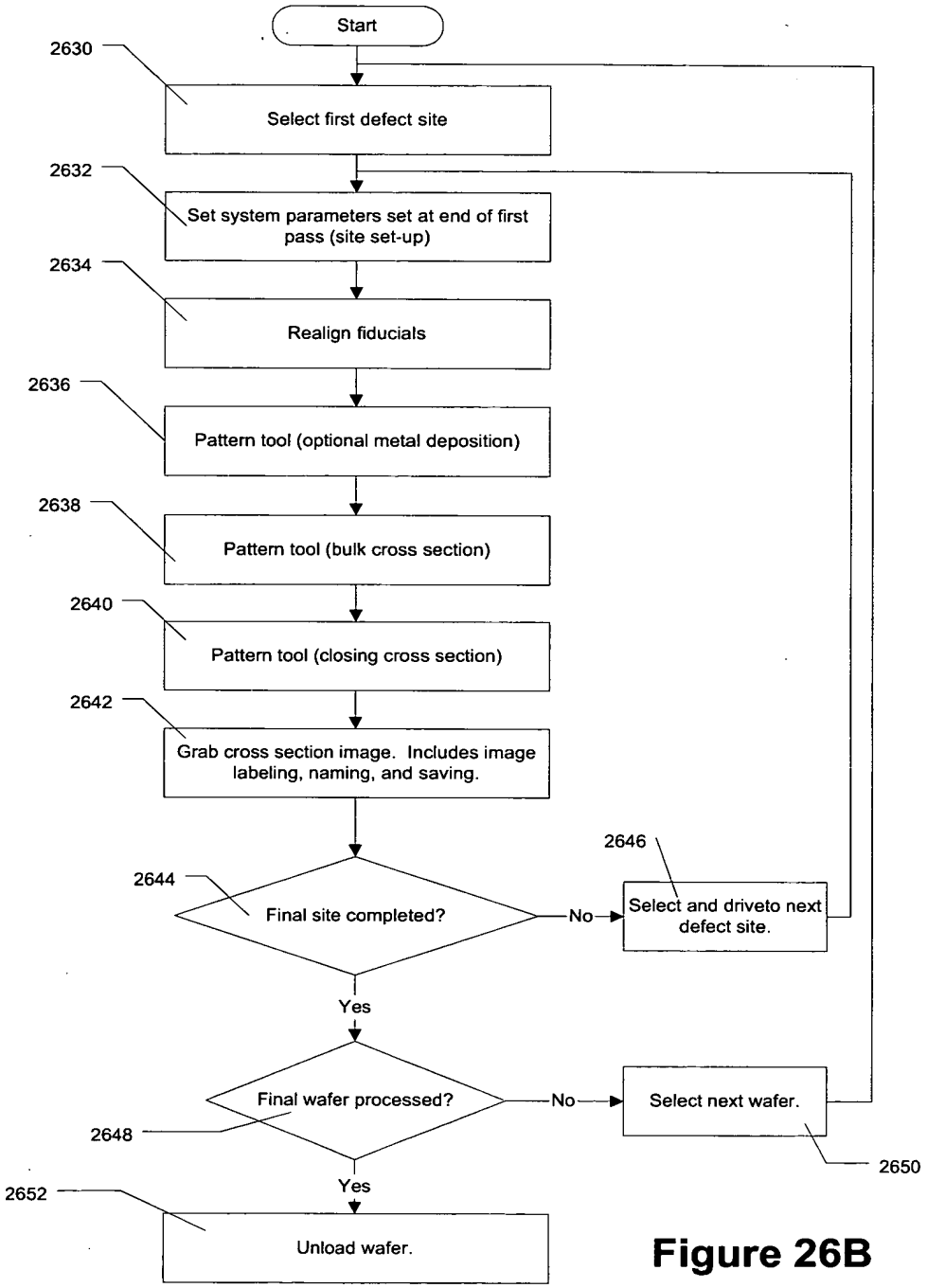

Start
2630
Select first defect site
2632
Set system parameters set at end of first pass (site set-up)
2634
Realign fiducials
2636
Pattern tool (optional metal deposition)
2638
Pattern tool (bulk cross section)
2640
Pattern tool (closing cross section)
2642
Grab cross section image. Includes image labeling, naming, and saving.
2644
Final site completed?
No
2646
Select and driveto next defect site.
Yes
Final wafer processed?
No
Select next wafer.
2648
2650
Yes
2652
Unload wafer.

Figure 26B

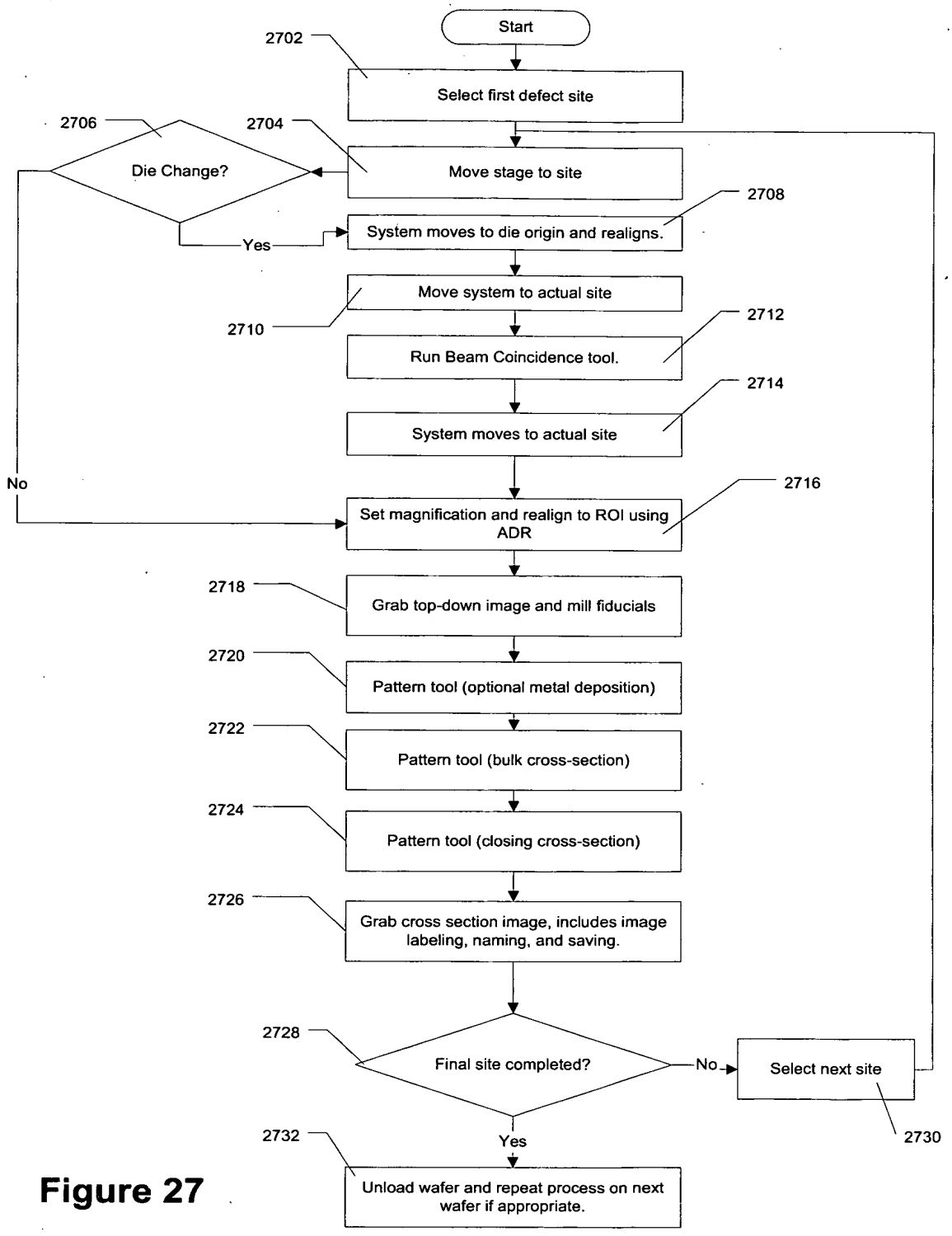

Start
2702
Select first defect site
2706
Die Change?
2704
Move stage to site
2708
System moves to die origin and realigns.
Yes
Move system to actual site
2710
2712
Run Beam Coincidence tool.
2714
System moves to actual site
No
2716
Set magnification and realign to ROI using ADR
2718
Grab top-down image and mill fiducials
2720
Pattern tool (optional metal deposition)
2722
Pattern tool (bulk cross-section)
2724
Pattern tool (closing cross-section)
2726
Grab cross section image, includes image labeling, naming, and saving.
2728
Final site completed?
No
Select next site
2730
Yes
2732
Unload wafer and repeat process on next wafer if appropriate.

Figure 27